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Wisdom is humble that he knows no more.'—COWPER.

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WELL-KNOWN TEACHERS AT WORK.

XXXI.—MR. W. B. ADAMS,

Head Master, Fleet Road Higher Grade Board School, Hampstead.

THE remarkable success achieved by Mr. W. B. Adams at Fleet Road during the past few years has made his school favourably known to a large number of those who take a practical interest in the progress of popular education. This success constitutes, in our opinion, a genuine and legitimate reason for including the master of Fleet Road School in this series of sketches, and for placing before our readers a tolerably full record of his career. We feel, therefore, under special obligation to Mr. Adams, not only for his extremely hearty welcome on the occasion of our visit to his school, but also for the great readiness with which he put us in possession of all sorts of information respecting his work.

Mr. Adams was born at Pembroke, and was the son of Mr. John Adams, an enthusiastic teacher, who had been trained at the old Borough Road College, and was afterwards master of the Swansea British School. Here, under his father, W. B. Adams served his term as pupil-teacher, and at the end of his apprenticeship entered Bangor Training College as a Queen's Scholar. There he was a student in 1861–2, and is able to boast that while there he swam across the Menai Strait, a feat accomplished by no other Bangor student up to the present time. At the close of his period of training he was appointed Head Master of Pembroke British School, entering on his duties there in 1863. The school was then held in an old malthouse; but owing partly, no doubt, to the fact that Mr. Adams was a native of the town, and partly also to the success of his efforts, all parties united in speedily providing means to erect handsome new buildings, in which he continued his work till 1868, when he was appointed to the Finchley British School. At Finchley he remained only about two years, his successor in 1870 being his brother, Mr. F. J. Adams, now barrister-at-law, and clerk of the Tottenham School Board.

In 1870 the death of Mr. Daniel Blay, an old Borough Road student, caused a vacancy in the Portland British School—the largest school of the kind in the West End. This school, founded by Dr. James Martineau, was chiefly supported by the Unitarian body. It was, however, strictly undenominational, being carried on under the principles of the British and Foreign School Society, and no attempts were made at proselytising. New school buildings had recently been raised at a cost of £8,000, contributed entirely by Unitarians without any Government aid. Mr. Adams was one of a large number of candidates, and though he was not a Unitarian, he secured appointment as Head Master, the recommendation of Mr. Matthew Arnold, who had known him as scholar, pupil-teacher, and master, having no doubt much to do with his selection. Mr. Arnold wrote to Dr. Martineau: 'I seldom interfere in the appointment of teachers, but Mr. Adams is so efficient a teacher, that I cannot help writing to say that I think him so. You need have no anxiety, as he is a certain success.'

The inspector's confidence appears to have been fully justified by Mr. Adams' management of the Portland British School, for after about eight years' work there we find him resigning his charge to take up his appointment at Fleet Road, and on that occasion the Rev. Dr. Martineau, the chief manager, wrote: 'Mr. Adams' conspicuous success here during the last eight years has been due to his rare skill as an organiser, his untiring zeal and enthusiasm, and the stimulating power of his own quick intelligence upon the minds of the scholars. His honourable ambition to equip his scholars for the front rank in the competitions of their life is sufficient alone to stamp him as a teacher of the first order. The anxiety with which the managers receive his resignation is the sincerest tribute they can render to the value of his services.'

The opinion of Mr. C. H. Alderson, H.M.I., was expressed in the following sentence: 'Mr. Adams has always appeared to me to combine, in a remarkable degree, two of the greatest qualifications of a schoolmaster—organising skill and enthusiasm in his work.'

BRITISH MUSEUM

And now for a few words on the growth of the Fleet Road School. 'When I entered on my duties here in February 1878,' says Mr. Adams, 'it was as Head Master of a new temporary school, with 50 scholars and one assistant. The numbers, however, rapidly increased, and when the permanent building was opened in January 1879, with accommodation for 480 scholars, 475 were admitted on the first day. Still the numbers grew, and before long additions were made which raised the accommodation to 816, and this was speedily found to be insufficient. A new department was then projected to relieve the upper department, by providing accommodation for 450 scholars of Standards I. and II. Pending the erection of the new building, the central hall was recognised as affording additional accommodation, and before the junior school was opened the number on the roll had increased to 1,106, and the number actually presented for examination was 1,013. In January 1884 the new building was opened as a Junior Mixed Department under Mrs. Adams, and this afforded immediate relief; but the senior school, with some later additions, now accommodates 850 boys and girls, and is at present over full. The number on the roll is 925, and 817 are at this time in attendance. This is, I believe, the largest single department under the School Board for London.'

We ought to say something of the position of the Fleet Road School, and the character of its buildings. It is situated in a pleasant and healthy suburb, within a few minutes' walk of Hampstead Heath, and not far from the foot of the fine open fields of Parliament Hill. On all sides are new roads, whose rapid construction in recent years goes far to account for the extraordinary development of the school. The buildings that afford accommodation for so large a number of scholars present no imposing elevation. They may be said to sprawl rather than to lift the head; for this is one of the very few large schools of London the whole of whose class-rooms are on the ground floor. With the buildings for the junior and infants' departments, which are separate, and also on the ground floor, we have at present nothing to do. The senior department consists of a spacious central hall, surrounded by no fewer than fourteen class-rooms. Two of the latter open directly from one side of the hall, and three from the other side, while corridors cross each end, from which respectively four and five class-rooms are reached.

The central hall is a delightful room, measuring 72 feet by 40. It is not lofty, but has a very pleasant appearance, being extremely well-lighted from a skilfully constructed glazed roof. Its chief charm, however, is the remarkable collection of engravings, etchings, and photographs which adorn its walls. These number considerably over a hundred, and as we stroll round with the Head Master, and remark on the envy with which many a teacher would view this artistic display, we hear, with keen interest, an account of the growth of this picture gallery. Many of them, we note, are not those supplied by the Board to its schools, and Mr. Adams calls our attention to several which bear on the oak frames brass tablets inscribed with the names of the donors. One is given by Prince Damrong of Siam, another by Sir Talbot Llewellyn, Bart., several by the Hon. Lyulph Stanley and Mrs. Stanley, one by the Duchess of Westminster, and another by Lady George Hamilton. Other donors are Mr. Rupert Potter, Mr. Alderson, and Miss Nevinson. 'The gem of the whole,' says Mr. Adams, 'is the splendid set of engravings from Raphael's Cartoons, and these were presented by Mr. Stanley, Dr. Gervis, Mr. Jos. King, Mr. Edw. Bond, Miss Davenport Hill, Miss Julia Hill, Mrs. Maitland, Mrs. Heberden, Mr. W. Martin, and others.'

Here is a fine engraving of Leighton's Captive Andromache, presented by the Board on the occasion of the school choir gaining the Challenge Medallion for Vocal Music in 1891, and another was acquired in the same way in 1892. There is also the remarkable 'Madonna di San Sisto,' a token of honourable mention in the last competition, 1893.

'Then,' says our friend, 'the old scholars show a constant interest in the school, and knowing my love of pictures and my desire to foster this love in others, they present from time to time beautiful engravings for the adornment of the hall. Only a few weeks ago, for instance, I was surprised and delighted to find on the walls this fine copy of the "Roll Call," given by old scholars.'

Our attention is arrested by a numerous series of historical portraits, and Mr. Adams explains their presence thus: 'On the invitation of the Art for Schools Association, I made some suggestions as to a selection of historical portraits for publication, and supplied some short biographical sketches to accompany them. The Society carried out the suggestions, published the sketches, and presented me with a set of the engravings, which I have had the pleasure of transferring to the school.'

At one end of the hall two large honour boards are affixed to the wall; one of these is quite full, and the other nearly half full, of names of boys and girls who have gained scholarships at the annual examinations held by the Board. The total number of successful pupils during the past twelve years is over 40, and the total value of the scholarships gained by this school in that time is £6,000. These successes are further commemorated by a collection of portraits of the winners. Three large frames contain twelve each, and a fourth dozen is in course of collection. Some of the details respecting the scholarships are very striking. In 1887 the first two places for boys and the first two for girls were taken by pupils of this school. In 1888 only seven open scholarships were competed for, and four, including the two highest, were gained by pupils of the school. For four years Fleet Road School has supplied the top boy in the competition for the Bancroft Scholarships, value £60 a year for four years, and the Lady Alderson Scholarship, founded in 1886, has always been held by this school. In 1891 the value of the scholarships gained exceeded £1,000, and this year makes an approach to that amount.

A short time ago a very pleasant gathering took place in this hall for the presentation of prizes given by the Hon. E. L. Stanley to the winners of the scholarships, and we had the privilege of being present (for our knowledge of Mr. Adams and his school is not limited to the visit on which this paper is based). The meeting was enlivened by some delightful music, on which Fleet Road School has good reason to pride itself. Some part-songs were very sweetly rendered, and two of the children sang some solos with exquisite taste. A little girl of ten

astonished the visitors by her charming singing of Arne's 'Where the bee sucks,' and, in response to an encore, gave 'Sing, sweet bird,' with wonderfully correct intonation, the trill at the end and the close on upper C having the finish of a trained artiste. The musical performances were followed by an excellent display of Swedish drill by the senior girls under the direction of Miss Coquille, one of the assistants.

This may seem a digression, but it has a relation to the central hall and its decoration; for, as we have said already, some of the pictures we have admired were the result of successes of the school choir in the musical competitions of recent years. The preparation for these has for many years been made under the skilful management of Mr. Jesse Harris, a teacher in the school.

'As a further result of the musical training,' says Mr. Adams, 'there is hardly a concert given in the district which is not helped, and scarcely a church choir which is not recruited by old scholars from this school.'

As we notice the grand piano near one end of the hall, Mr. Adams says, 'Yes, it is an Erard,' and on our asking how it was obtained, he adds, 'We bought it out of the proceeds of our entertainments. Our annual concert and entertainment is a grand feature here, and attracts visitors from all quarters of London; Mr. Kekewich, Secretary of the Education Department, and many other leading friends of education have frequently honoured us with their presence. Our programme always includes selections from the works of such masters as Handel, Mozart, Mendelssohn, Beethoven. One of the most pleasing features of these gatherings is the readiness of old scholars to place their services at our disposal.'

Yours faithfully
William B. Adams.

Mr. Adams evidently knows what will 'bring grist to the mill,' and he knows also what use to make of the grist, for he tells us of many things useful for the school which have been provided out of the entertainment fund. 'We are seldom without a few pounds in hand,' he says, 'and we find many ways to apply it. Sometimes we use some of it to send a poor sick child to the seaside or the country.'

This suggests another of the institutions of the school. Every year a collection of used clothing is made by the scholars to send away to some school in a poorer district, where the children may be glad of the help thus afforded. Our attention is called to a letter received a short time ago from the Head Master of an East End school, which expresses thanks for parcels of clothing, and says, 'Your scholars may rest assured that some of their poorer fellows are warmer, their days made a little more endurable, and their comfort greater, by their kindness.'

Let us now turn from the hall, with its honour boards, pictures, and other memorials of victory, to the class-rooms, where the real work of the school is chiefly done. First, Mr. Adams leads us to the last completed room, which is adapted specially for science teaching, and is fitted with a chemical laboratory. Here the Ex. VII. pupils are taught, and, as the Head Master says with evident satisfaction, 'here we are free from codal requirements and restrictions. The curriculum is arranged to allow of much freedom; commercial subjects, such as book-keeping, French, shorthand, geography, arithmetic, and composition occupy a prominent place. Shorthand, taught according to the *Script* system, and French are found extremely useful both for boys and girls. Practical as well as theoretical chemistry is regularly taught. Many of the scholars are prepared for the Civil Service examinations, and for situations in commercial houses. Indeed, I can hardly keep pace with the demand for such scholars.' The Ex. VII. class numbers over 50 pupils, 48 being present on the day of our visit. All of them appear to find the work very interesting, as well they may. We saw some good specimens of maps, of coloured science diagrams, and of examination papers. 'One noteworthy feature in this part of the school is the Exchange Library. The pupils bring their own books and lend them to their class fellows, the plan of exchange being carefully organised by Mr. Miles, the teacher in charge of the class. This arrangement is highly appreciated by the scholars, and is in many ways beneficial.'

We pass in succession through various class-rooms occupied by different divisions of the several standards from VII. down to III. In one part of Standard VI. we are shown some capital coloured chalk drawings, including original floral designs for wall papers. In another part of the same standard the children are engaged on a history lesson. This is a subject which Mr. Adams has made a special feature. He has drawn up a graduated syllabus for all the standards, and in the upper ones carefully-constructed sheets of notes, copied by the trypograph, are put in the

hands of each scholar, so that the points of the lesson may be the better followed as the teacher proceeds with his comments and illustrations. One of these sheets was placed at our disposal, and it contains on two pages of foolscap materials for a very thorough course of instruction on the Stuart Period. But in this department of school work Mr. Adams is an expert and an enthusiast. He has produced a capital text-book, 'Leading Events in English History' (W. and R. Chambers), of which the *Schoolmaster* said: 'This is one of the very best handbooks of history we have seen. The biographical sketches are excellent. The author is a master of terse and vigorous English.' He has also published 'Biographical Sketches,' and 'Historical Notes and Queries.' (Stewart and Co.) In the early years of the Pupil Teacher Centre System, Mr. Adams taught history at two Centres, Finsbury and Marylebone.

Here is an extract from the evidence which Mr. Adams gave as a witness before the Royal Commission of 1887:—'I think that perhaps the reason why history has been made unpopular in a great many schools is that the children have been made to swallow wholesale lists of the mere names of the Saxon kings, instead of getting the light and colour, so to speak, of the great events of history. I think that we should devote our attention to later times, when the nation, already formed and rooted, began to grow from within, and to found a great colonial empire. I should give pictures of the daily life and manners of our ancestors, as being both attractive and useful, and sketches of the great men who have helped to give us good laws and good government.' To the success which has attended Mr. Adams' efforts to carry his scheme into practice, Mr. Matthew Arnold and Mr. Alderson have borne their valuable testimony. The former said: 'The instruction in history is surprisingly good, and quite remarkable for its fulness and accuracy.' The latter described the instruction as 'admirable,' and added, 'it is rare to find a school in which the subject is so well taught throughout.'

Visiting the Seventh Standard class-room, we are able to see a set of papers in shorthand just completed. They have been written to dictation at the rate of about 40 words per minute, and then carefully transcribed in longhand. There appear to be very few mistakes, and the work of the whole class is neatly done. The same may be said of a set of maps, also done during the afternoon. This subject is taught to all in the upper standards with very satisfactory results. In more than one of the classes we observe that the blackboard notes of the lessons given in history or geography are written partly in shorthand, to economise space.

One of the classes is engaged in learning a new school song, in two parts, the notes being placed on the blackboard and sung off with perfect accuracy. The musical results obtained in this school, as we have already indicated, and as we have had opportunity of judging at the annual competitions, are far beyond the average. They go far, indeed, to justify the opinion expressed by the secretary of Prince Damrong, of Siam, that 'the choir was up to the standard of the finest part-singing of any choir whose time is kept solely for music.' Mr. McNaught, one of the adjudicators in the competition two years ago, said of the excellence of the voice production, that it 'would have been creditable to a cathedral choir.'

It is needless for us to comment on the work of all the standards; let it suffice to say that in every part of the school there were the same signs of organisation, of life, and of thoroughness. The organisation is, of course, largely influenced by the fact that the school is a mixed one for boys and girls. This obviously makes the classification more perfect, as it makes it possible to have a greater number of graduated classes.

The present seems to us a capital opportunity of getting a sound opinion on the question of mixed schools. In reply to our inquiry, Mr. Adams pronounces himself altogether favourable. He said, 'I have had 25 years' experience in mixed schools, and have never found the slightest difficulty from the fact of the boys and girls being taught together. By some a school is assumed to be the only place where a common atmosphere for girls and boys is pernicious. Boys and girls go to church, to parties, to entertainments together. I see no logical ground for separating them at school. The model of a school should be that of a well-ordered family. That is my ideal, and I always try to keep it in view. Girls are kept up to the standard of the boys, and I think they stay longer in a mixed school than in separate girls' schools. They undoubtedly gain in courage and in candour, while their presence has a good influence on the behaviour of the boys, who never like to be punished or disgraced before girls.'

After the close of the school, we spent some time with our host in his spacious private room, and found much interest in looking over the visitors' book and other records. Many people of distinction have visited this famous school, and have recorded their favourable opinions, among them Sir David Evans, Lord Mayor of London: Sir Alexander Croft, Director of Public Instruction in Bengal; Prince Damrong, of Siam. From the annals of the school we find that it has invariably obtained the highest award from her Majesty's Inspector, and the mark 'Excellent' for drawing. A cookery room forms part of the school equipment, and the addition of a workshop adapted for manual training, now in course of erection, will make the building as complete as any under the School Board.

The school is now recognised as one where the Scholarships awarded by the London County Council may be held. Doubtless many of these will in future be gained and held here.

Amongst other useful features our attention is directed to the school magazine, which has been in existence for about three years, and has a circulation of some 500 copies. It serves to encourage the practice of home reading, and to foster the interest of parents by keeping them informed of the incidents which mark the life of the school. Cricket and football clubs are formed among the boys, who have excellent chances of practice near the school. Swimming is also encouraged, and many of the pupils join the local clubs.

Everyone must admit that the success of this school has been what is called phenomenal; but some may regard this as due chiefly to its peculiarly favourable circumstances—to its situation, and to the class of children who attend. Mr. Adams readily admits the potent influence of these factors, as he does also of others tending in the same direction. Thus he insists very earnestly on the extreme value of the loyal and sympathetic co-operation of his staff, and on the unfailing interest and sympathy of an enlightened body of managers, on which, by-the-bye, a former pupil of the school has recently been appointed. 'Among my managers,' he says, 'must be named Mr. E. Barnes, J.P., who has been chairman for the last nine years, and has been most active in promoting the welfare of the school and the comfort of the teachers, and who has thus won golden opinions from parents, teachers and scholars. The Hon. Lyulph Stanley also has taken the warmest interest in the school from its foundation, and has fired all concerned in it with his own educational zeal.'

Of his staff Mr. Adams says: 'The success of the school is largely due to their hearty exertions. The work of each member has been directed to securing the good of the school as a whole rather than to the special distinction of separate classes. For instance, Mr. Jesse Harris has worked with much energy and skill in the training of the school choir, whose success has been so marked. Miss Coquille has rendered valuable assistance in connection with the teaching of French, and in the Swedish drill. Miss Howarth, Mr. James, and Mr. Smith have done excellent work in shorthand, and Miss Howarth also in colour-drawing and secretarial duties, while Miss May and Mr. Miles have managed the school libraries. I have altogether 15 assistants, six of whom are ladies, and these I find quite as successful as the men in teaching mixed classes. Standards VII. and Ex. VII. are for the most part in the hands of masters. Of course, in the natural order of things, there are changes from time to time in so large a staff, but some have been with me a long time. Among those who have left for good positions are Miss A. F. Bird, Normal Mistress of the University Day Training College, Nottingham; Miss A. M. Steele, Head Mistress Dulwich Hamlet Board School; Miss E. Pratt, Head Mistress Chouinert Road Board School; Mr. W. Winter, H.M.I.A., Marylebone; Mr. J. Sadd, Head Master Marylebone P.T. Centre; Mr. H. Hills, B.A., Aske's School, Hatcham; and Mr. J. H. Dare, Head Master Barrow Hill Road Board School. The last-named, until his recent promotion, rendered most valuable service in preparing the boys and girls for Scholarship Examinations.

'Among my assistants I am glad to say I have some whose fathers were schoolmasters and friends of mine. There is something in heredity: I think I inherited my love of school work, and I trust my son, who is now finishing his course at Oxford, may also carry on the tradition, and be successful in some branch of educational work.'

Mr. Adams dwells with natural pride on the career of his son, who was a P.T. in this school, and then a student at Boro' Road. After passing the Inter B.A. Examination at London University he entered Pembroke College, Oxford, where he has been reading for honours, and has nevertheless carried forward his fame as a good all-round cricketer by becoming the captain of the Pembroke College eleven, as well as a member of the football team.

Glancing again at the evidence given by Mr. Adams before the Royal Commission, we may note that besides advocating the teaching of history as a class subject in all the standards, and the extension of mixed schools, he strongly urged that greater consideration should be shown to schools in poor districts, and that there should be less stringent requirements for girls, especially in needlework. He further advocated that the curriculum of the standards from the fifth upwards should be made as elastic as possible, so as to give a chance of doing justice to the bent of the scholar; that grants for specific subjects should be paid on the average rather than on the individual passes; and that visits to places of public or historical interest, such as the Tower of London, Westminster Abbey, and so on, should count as school attendance. In some of these matters it will be recognised that definite advance has been made in recent years. After Mr. Adams had given his evidence he received a letter from Mr. Sidney Buxton, M.P., in which he said 'the Commissioners attach great weight to your evidence, and it has given us all much food for thought.'

Mr. Adams takes considerable interest in movements affecting teachers. He was one of the founders of the Marylebone Teachers' Association in 1873, and has ever since been a member, having twice been elected president. During his second term of office he organised a very successful dramatic performance under distinguished patronage for the benefit of the Teachers' Orphanage and the Church Teachers' Benevolent Fund. Lord Cranbrook, then Lord President of the Council, sent a cheque for five guineas to the fund. It is, perhaps, rather to the social

FLEET ROAD HIGHER GRADE SCHOOL.—SENIOR DEPARTMENT.—TIME TABLE, 1893-4.

Class.	9.0—9.5.	9.5—9.40.	9.40—9.50.	9.50—9.55.	9.55—10.40.	10.40—11.0.	11—11.45.	11.45—12.	—
1	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	English	Drill	Arithmetic	Repetition or Ment. Arith.	MONDAY.
2	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	English	Drill	Arithmetic	Repetition or Ment. Arith.	
3	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	English	Drill	Arithmetic	Repetition or Ment. Arith.	
4	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Drill	11—11.30. Reading	11.30—12.0. Dictation	
5	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Drill	English	Reading	
1	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Singing	11—11.45. Reading	11.45—12.0. Repetition or Ment. Arith.	TUESDAY.
2	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Singing	Reading	Repetition or Ment. Arith.	
3	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Singing	Reading	Repetition or Ment. Arith.	
4	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell	Regs. Closed	Arithmetic	Singing	11—11.30. Reading	11.30—12.0. Grammar	
5	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Singing	Reading	Dictation	
1	Regs. Markd.	Prayers and Scripture	9.40—10.15. B. Reptition, Mental Arith. or Spelling G. Drawing	Regs. Closed	10.15—10.40. Arithmetic	Drill	11—11.45. Composition or Dictation	11.45—12.0. Writing (Forms of Letters)	WEDNESDAY.
2	Regs. Markd.	Prayers and Scripture	B. Repetition, Mental Arith. or Spelling G. Drawing	Regs. Closed	Arithmetic	Drill	Composition or Dictation	Writing (Forms of Letters)	
3	Regs. Markd.	Prayers and Scripture	B. Repetition, Mental Arith. or Spelling G. Drawing	Regs. Closed	Arithmetic	Drill	Composition or Dictation	Repetition or Ment. Arith.	
4	Regs. Markd.	Prayers and Scripture	Map Drawing	Regs. Closed	Arithmetic	Drill	11—11.30. Reading	11.30—12.0. Repetition	
5	Regs. Markd.	Prayers and Scripture	Map Drawing	Regs. Closed	Arithmetic	Drill	Reading	Dictation	
1	Regs. Markd.	Prayers and Scripture	9.40—9.50. Reptn., Ment. Arith.or Spell.	Regs. Closed	9.55—10.40. Arithmetic	Drill	English	History	THURSDAY.
2	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Drill	English	History	
3	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Drill	English	History	
4	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Dictation	Drill	Reading	Arithmetic	
5	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Drill	English	Reading	
1	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Singing	Reading	Composition or Dictation	FRIDAY.
2	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Composition	Singing	Arithmetic	Arithmetic	
3	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Singing	Reading	11.30—12. Composition or Dictation	
4	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Singing	Reading	Dictation	
5	Regs. Markd.	Prayers and Scripture	Reptn., Ment. Arith.or Spell.	Regs. Closed	Arithmetic	Singing	Reading	Dictation	

Class.	2—2.5.	2.5—2.30.	2.10—2.15.	2.30—3.0.	3.0—4.0.	4.0—4.30.
1	Regs. Markd.	Arith. (Slate or Mental)	Regs. Closed	Rdg. & Spll.	B. Fr.or Shtnd. G. Dom. Econ.	Singing
2	Regs. Markd.	Do.	Regs. Closed	Do.	Do.	Singing
3	Regs. Markd.	Do.	Regs. Closed	Do.	Do.	Singing
4	Regs. Markd.	Writing Lessn.	Regs. Closed	Grammar	Arithmetic	Singing
5	Regs. Markd.	2.5—2.45. Writing Lessn.	Regs. Closed	2.45—3.30. Reading	3.30—4.0. Dictation	Singing
1	Regs. Markd.	2.5—3.0. B. Drawing 2.5—3.30. G. Ndlework.	Regs. Closed		3.0—4.0. B. Algebra 3.30—4.0. G. Drawing	History
2	Regs. Markd.	Do.	Regs. Closed		Do.	History
3	Regs. Markd.	Do.	Regs. Closed		Do.	History
4	Regs. Markd.	B. Drawing or Arithmetic G. Ndlework.	Regs. Closed		B. Arith. or Drawing G. Drawing	Geography
5	Regs. Markd.	B. Drawing G. Ndlework.	Regs. Closed	3.0—3.30. B. Reading	3.30—4.0. B.Dict. G.Dwg.	Geography
1	Regs. Markd.	B. Drawing G. Ndlework.	Regs. Closed		3.0—4.0. B. Algebra 3.30—4.0. G. Drawing	Arithmetic
2	Regs. Markd.	Do.	Regs. Closed		Do.	Grammar.
3	Regs. Markd.	Do.	Regs. Closed		Do.	Arithmetic
4	Regs. Markd.	B. Drawing or Arithmetic G. Ndlework.	Regs. Closed		B. Arith. or Drawing. G. Drawing	Collective Less.
5	Regs. Markd.	B. Drawing G. Ndlework.	Regs. Closed	3.0—3.30. B. Reading	3.30—4.0. B. Dictation G. Drawing	Collective Less.
1	Regs. Markd.	2.5—2.30. Arith. (Slate or Mental)	Regs. Closed	2.30—3.0. Compstn. or Dictation	3.0—4.0. B. Fr.or Shtnd. G. Dom. Econ.	Writing
2	Regs. Markd.	Do.	Regs. Closed	Do.	Do.	Writing
3	Regs. Markd.	Do.	Regs. Closed	2.30—3.15. Compstn. or Dictation		3.15—4.30. B. Algebra. G. Dom. Econ.
4	Regs. Markd.	Writing Lessn.	Regs. Closed	Grammar	Arithmetic	4.0—4.30. Geography
5	Regs. Markd.	2.5—2.45. Writing Lessn.	Regs. Closed	2.45—3.30. Reading	3.30—4.0. B. Dictation.	Geography
1	Regs. Markd.	2.5—2.30. Arith. (Slate or Mental)	Regs. Closed	2.30—3.0. Writing	3.0—3.30. B. Fr.or Shtnd. G. Arithmetic	3.30—4.30. Singing
2	Regs. Markd.	Do.	Regs. Closed	Do.	2.30—3.30. Fr. or Shtnd.	Singing
3	Regs. Markd.	Do.	Regs. Closed		Fr. or Shtnd.	Fr. or Shtnd.
4	Regs. Markd.	Spelling	Regs. Closed	2.30—3.15. Copybks. or Wrtng Ex.	3.15—4.0. Reading.	4.0—4.30. Ment. Arith. or Tables
5	Regs. Markd.	Copybooks	Regs. Closed	Arithmetic	Do.	Geography

FLEET ROAD HIGHER GRADE SCHOOL.—TIME TABLE.—STANDARD Ex. VII.

	MORNING.					AFTERNOON.			
DAY.	9.0—9.10.	9.10—9.40.	9.40—10.40.	10.40—11.0.	11.0—12.0.	2.0—2.30.	2.30—3.30.	3.30—4.30.	4.30—5.0.
MONDAY.	Mark Registers.	Scripture, N. T.	Arithmetic	Recreation or Drill	Book-keeping	Copy Writing	Geography	French	Elementary Science
TUESDAY.	Mark Registers	Scripture, O. T.	Composition Exercise	Recreation or Drill	Shorthand	Mapping	BOYS—Drawing and Algebra. GIRLS—Needlework.		
WEDNESDAY.	Mark Registers	Scripture, N. T.	Arithmetic	Recreation or Drill	Book-keeping	Copy Writing	Geography	Theoretical Chemistry	Elementary Science
THURSDAY.	Mark Registers	Scripture, O. T.	Composition	Recreation or Drill	Shorthand	Mapping	*See* TUESDAY.		
FRIDAY.	Mark Registers	Scripture, N. T.	Arithmetic	Recreation or Drill	English Lesson from Citizen Reader	Copy Writing	Geography	French	Readings from Standard Authors.

side of teachers' associations than to the fighting programme that Mr. Adams' sympathies lean. He was especially instrumental some ten years ago in starting the British Teachers' Club, and now in presiding at its meetings or arranging its entertainments he is thoroughly at home, as we have had excellent opportunities of knowing. Last year he assisted at the first reunion at Bangor Training College, where he was the honoured guest of the Principal, and where he had a very hearty reception on addressing the students.

For some time past Mr. Adams has had a seat on the Committee of the British and Foreign School Society; he is also on the Committee of the London Board Head Teachers' Association. Through the good offices of Lord Aberdare, who was impressed with his views on the teaching of history, he was elected a Fellow of the Royal Historical Society.

We can well understand how entirely Mr. Adams would be in his element in March last, when as President of the Pembrokeshire County Club he filled the chair at the club's annual dinner, supported as he was by the members for his native county and its boroughs, as well as notabilities of the district, and a company of over 100 members.

But after all it is in his school that he is most at home. 'My school,' he says, 'is my hobby. With delight I have watched its development; and I may repeat what I said on the occasion of the Lord Mayor, Sir David Evans' visit,—When I opened the Fleet Road School fifteen years ago, I found it a wilderness: it is now to me a large and beautiful garden, with my boys and girls for fruits and flowers.'

When all has been said on the score of favourable circumstances, it must be allowed that the personality of the teacher is the most important factor in the success of a school, and in the present case it is doubtless true that the two qualifications referred to by Mr. Alderson—Mr. Adams' 'organising skill and enthusiasm in the work'—have been the main causes of the prosperity of Fleet Road School.

Fortunate indeed is the teacher, however energetic and accomplished, who finds himself at the head of a school whose favourable conditions afford full scope for his powers, and make possible the achievement of results unattainable elsewhere; but no less fortunate is the school, however favourable its conditions, which has at its head a teacher who is ready to make the most of all its advantages, and so to realise the highest educational results which its excellent circumstances permit. Thus fortunate, without doubt, are Mr. W. B. Adams and the Fleet Road School.

Well would it be if such schools and teachers were more numerous than they are. There should be a ring of such schools in the suburban districts of London. Why does the School Board not lay aside its manufacture of mischievous circulars and vexatious regulations, and abandon its unseemly indulgence in pseudo-theological or politico-theological wrangling, and set itself to work at the establishment and development of schools of this higher type in every suitable district of the metropolis? So would an important step be taken in the direction of that organisation of secondary education and its correlation with primary education which is a crying need of our time.

TEACHERS' DRAWING LESSONS.

FREEHAND.

STANDARD V.

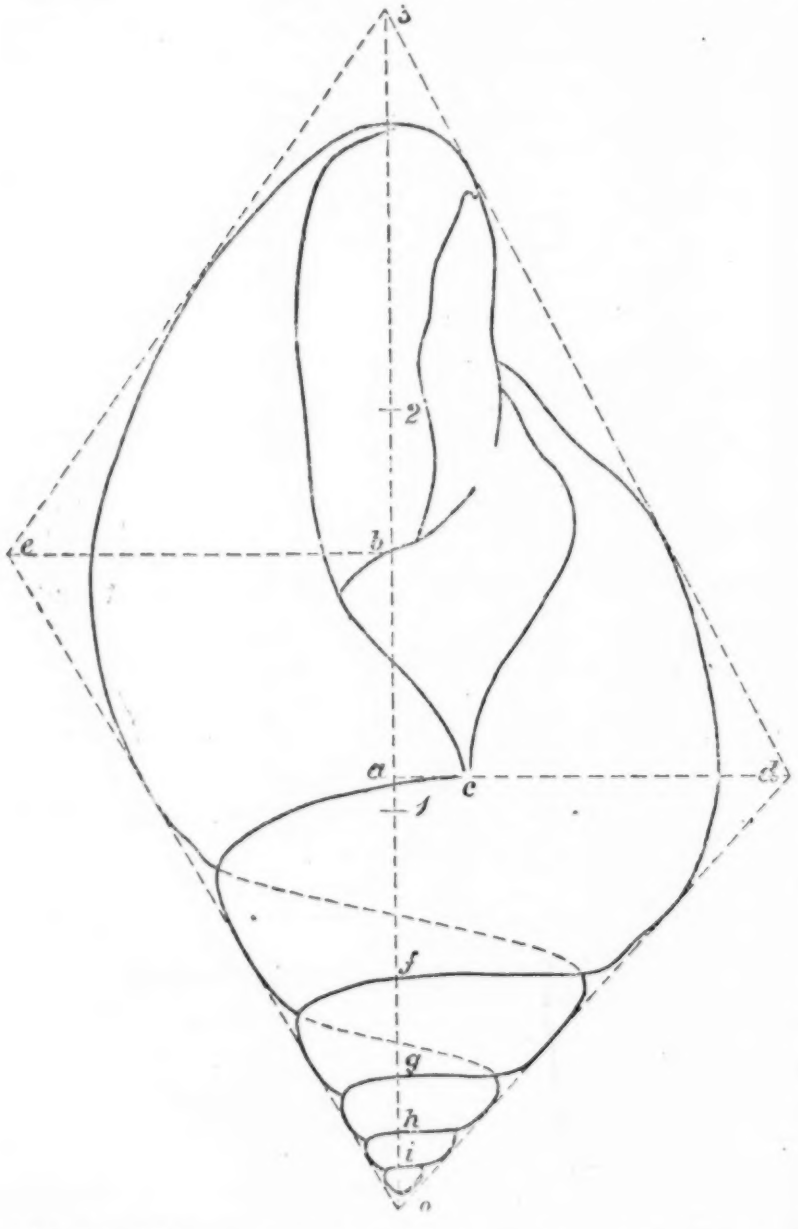
BY E. BUFFERY RIDGE,
Art Master under the London School Board.

8. A Shell. This figure is roughly four-sided; its longest measurement is nearly twice the length of its shortest. Draw the long line *o* 3 not quite upright on the paper, the top end leaning slightly to the left.

Three of the sides seem to ask for straight lines to touch them, and having these, *eo*, *od*, *d* 3, with the centre line 3 *o*, it is advisable to complete the quadrilateral with the line 3 *e*.

Measure across between the long sides, and see if the distance is rather more than half *o* 3.

Divide *o* 3 into three equal parts—draw horizontal lines *da* and *eb*. See if *a* is just above 1, and *ad* equal to one of the three equal parts of *o* 3. See also if *b* is rightly placed between 1 and 2 and *eb* nearly equal to 1 2. Fix point *c* on *ad*.



Draw from *c* the curve which crosses the centre-line and runs up to the top of shell, then through *b* the line with a break in it (disregarding the break) up and round the top, and down the left hand side. From this line, on the right hand of the shell, and just above the level of 2, two other lines spring, one is the right hand outline of the figure, the other runs down to *c*. The third line from *c*, slanting downwards to the left, is the beginning of the spiral. Trace the spiral zigzagging down the figure to the apex at *o*. The dotted curves show the path of the spiral across the *back* of the shell.

Mark *f*, half of *ao*;
„ *g*, half of *fo*;
„ *h*, half of *go*; and
„ *i*, half of *ho*.

Draw the curves through *c*, *f*, *g*, *h*, and *i* as nearly parallel as possible, and make each curve, when it reaches the side, continuous with a part of the outline, downwards on the left, and upwards on the right-hand side.

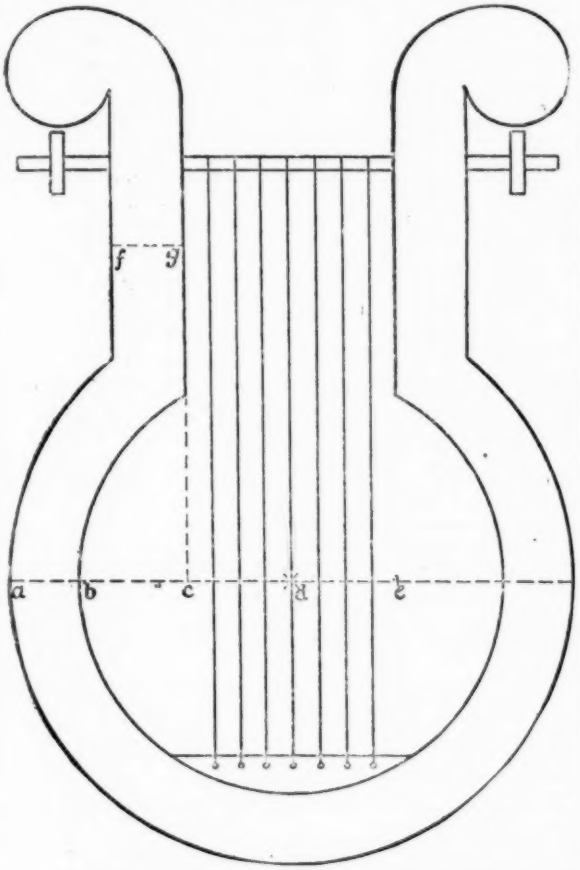
Be careful not to make the small part of the shell at the bottom like a round knob—it is nearly triangular, and its sides form parts of the sides of the shell. Complete the drawing, not forgetting to notice the shape and size of each of the spaces left between the shell and the straight lines, such as those at *e* and *d*.

9. A Lyre (see page 9).—Draw the two concentric circles, dividing the diameter of the inner one into four equal parts, and making *ab* about two-thirds of *bc*. The circles should be made complete, and cut by upright lines from *c* and *e*, and by others parallel to them, the distance *fg* being made equal to *ab*. The scrolls at the top make the width there equal to the diameter of the larger circle. For the strings, divide *ce* into 8 equal parts.

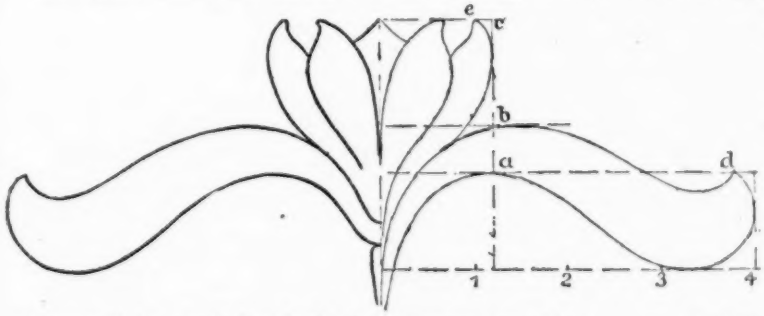
10. (See page 9.) This is a very difficult copy, not only on account of its great width compared with its height, but because of the delicacy of its curves and proportions.

The base line should be drawn first, and divided into eight equal parts, forming a sort of scale from which the other measurements can be taken. The

top is $2\frac{3}{4}$ divisions above the base-line, *a* just over one division, *ab* a little more than one-half, *bc* a little more than the height of *a*. The distance of *e* from the centre-line is one division.



Sketch the curve through *a*, growing up from the centre-line and ending at *d*, as shown on the right of the figure, then that through *b* to *d*, then up to *c*.



Care will be needed with the in-curvature from the upright at *c* to *e*, and with the similar feature at *d*. Both sides should be sketched in the same way, and each pair of curves made to balance nicely before proceeding with another pair. The 'growth' or up-springing of the lines should be carefully pointed out.

OUR PUPIL TEACHERS' COURSE.

I. Historical Notes.

A.—*Celebrated Parliaments.*

(1) '*The Mad Parliament*' (1258) which passed the 'Provisions of Oxford.'

(2) '*The Blessed Parliament*' (1350) which enacted the 'Statute of Treasons.'

(3) '*The Good Parliament*' (1376) secured the power of impeachment.

(4) '*The Wonderful and Merciless Parliament*' (1388). Two of Richard II.'s favourites were beheaded by the Lords Appellant.

(5) '*The Lack Learning Parliament*' (1404) much advanced the pecuniary power and immunity of members of the Commons.

(6) '*The Reformation Parliament*' (1529) abolished the Papal Supremacy and suppressed the Monasteries.

(7) '*The Addled Parliament*' (1614), although the elections were manipulated by James I., began to discuss grievances instead of granting money, and was promptly dissolved.

(8) '*The Short Parliament*' (1640) lasted only three weeks.

(9) '*The Long Parliament*' (1640), after many vicissitudes, was finally dissolved 1660.

(10) '*The Rival Parliament*' (1644) was assembled by Charles at Oxford. It was composed of Royalist members of the Long Parliament. It sat for three months only.

(11) '*The Rump Parliament*' (1648) consisted of about fifty members, Independents of the Long Parliament.

(12) '*The Little or Barebones Parliament*' (1653).

(13) '*The First Protectorate Parliament*' (1654) was notable for the newly-constituted 'House of Lords.'

(14) '*The First Convention Parliament*' (1660) brought about the Restoration.

(15) '*The Pension Parliament*' (1661) was strongly reactionary in the Royalist direction.

(16) '*The Drunken Parliament*' of Scotland (1661) repealed all Acts passed during the Protectorate, abandoned the Covenant, and again set up the Royal authority.

(17) '*The Second Convention Parliament*' (1689) gave the throne to William III. and Mary II.

(18) '*The Reformed Parliament*' (1833) was the first after the Great Reform Bill of 1832.

B.—Lives of Celebrated Persons.

First Year.—Julius Cæsar, Suetonius Paulinus, Agricola, Prince Arthur, Venerable Bede, Alfred, Canute, Godwin, Edward the Confessor, Harold II., Dunstan.

Second Year.—Hereward, Duke Robert, Edgar Atheling, Lanfranc, Anselm, Strongbow, Becket, Richard I., Prince Arthur, Langton, Montfort, Edward I., Wallace, Robert Bruce, Black Prince, Wiclif, Owen Glendower, Henry IV., Margaret of Anjou, John of Gaunt, Joan of Arc, Warwick.

Third Year.—Wolsey, Thomas Cromwell, Luther, Lady Jane Grey, Cranmer, Cardinal Pole, Knox, Mary Queen of Scots, Drake, Sydney, Burleigh, Raleigh, Shakespeare, Spenser, Lady Arabella Stuart, Hampden, Strafford, Falkland, Rupert, Leslie, Laud, Montrose, Cromwell, Monk, Charles II., Clarendon, Oates, Shaftesbury, Monmouth, Algernon Sydney, Argyle, Jeffreys.

II. Model Answers to Historical Questions, Examination 14th April, 1894.

A.—*First Year.*

(1) What traces of Roman colonization remain in England in (*a*) names of places and roads, (*b*) common words, (*c*) other things?

(*a*) *Names of Places and Roads.*

(α) Lancaster (*castor*); Worcester (*castra*); Lincoln (*colanid*); Fosbury (*fossa*); Pontefract (*pont*); Portland (*portus*); Ystrad, Stratford (*strata*); Wallbury, Bailey (*vallum*).

(β) Watling Street, Ikenild Street, Ermin Street, Foss Way.

(*b*) *Dish* (A.S. disc, L. discus); *pear* (A.S. pyrige, L. pirus); *tile* (A.S. tegol, L. tegula); *mile* (A.S. mil, L. millia passuum); *wall* (L. vallum).

(*c*) At Bath, Chester, Silchester, York, Uriconium, etc., are many Roman relics and ruins of buildings and walls.

(2) Explain the following:—*Eorl*, *thane*, *ceorl*, *stead*, *ham*, *tun* or *ton*.

(*a*) *Eorl* (alderman), the king's officer over a shire. This title was confused with and supplanted by *earl* (Dan. jarl).

(*b*) A *thane* was a Saxon gentleman. He might be a greater or lesser thane, a thane of the king, of an alderman, or of a bishop.

(*c*) A *ceorl* was an ordinary Saxon freeman. He might become a thane by owning five hides of land, by sailing three times with his own cargo to a foreign country, or by scholarship.

(*d*) *stead* (A.S. stede = a place), as Hampstead, bed-stead, home-stead.

(*e*) *ham* = dwelling or village, as Buckingham, hamlet.

(*f*) *tun* or *ton* = an enclosed place, as *Huntingdon*, often a modern contraction of town, as *Newton*.

3. Mention the chief Anglo-Saxon kingdoms before Egbert, and briefly sketch the rise and fall of one of them.

(*a*) *Kent*, founded 455.
(*b*) *Sussex*, founded 477.
(*c*) *Wessex*, founded 495.
(*d*) *Essex*, founded 527.
(*e*) *Bernicia*, founded 547.
(*f*) *Deira*, founded 560.
(*g*) *Northumbria* (Deira and Bernicia), founded 671.
(*h*) *East Anglia*, founded 571.
(*i*) *Mercia*, founded 586.
(*j*) *Middlesex* was a temporary offshoot from Essex.

History of Northumbria.—This kingdom was founded by the amalgamation of Bernicia and Deira, 671. In this year Egfrid defeated the Picts and captured Lincoln from Mercia. Three years later he ravaged eastern Ireland, but the following year fell in battle against the Scots. His reign is noted for his ecclesiastical struggles with Bishop Wilfred. His brother, Alfred the Wise, succeeded him, and reigned until 705. Eleven years later his son and successor, Osred, was slain by rebels. Next follow the usurpers, Cerdric, Osric, and Ceowulph, the last a learned, pious, but incapable king. He was dethroned in 730, and confined in a monastery. Within the next 100 years the kingdom was given over to ambition, treachery, and cruelty, no less than fourteen kings reigning, only one of whom died a natural death.

In 827 Egbert led an army against the Northumbrians, but they submitted somewhat gladly to his sway.

4. (*a*) Who were the chief agents in converting the English to Christianity? (*b*) What events favoured, (*c*) what events hindered its progress?

(*a*) The chief agents were Bertha, Queen of Kent, Pope Gregory I., and S. Augustine.

(*b*) Favourable circumstances were (α) the Christianity of Bertha; (β) the increasing commerce with the Continent, especially with France; (γ) the leaven of Christianity left by the Britons; (δ) the natural dissatisfaction with the ancient superstitions; (ε) the comparative tranquillity of the times.

(*c*) Adverse circumstances were (α) the hostility of the Mercian princes; (β) the conflict between the Romish and British churches; (γ) the sub-division of the country; (δ) the native independence of the Saxon character.

5. Write short accounts of *three* of the following persons:—*Oswald, Caedmon, Cuthbert, Tostig, Edgar Atheling.*

(*a*) *Oswald of Northumbria*, a younger son of Ethelfrith, took up arms, after the death of Edwin, against the heathen Mercians and the British Cadwallader, who for seven years had devastated his country. In 634 he slew Cadwallader, and annihilated his army. For the next eight years he strenuously exerted himself in the cause of order, civilization, and Christianity, but in 642 he, like his predecessor, fell before Penda.

(*b*) *Caedmon* wrote in the end of the 7th century, and died about 680. He was originally a poor, ignorant hind, serving the monastery of Whitby, where his poetical faculties are said to have been first excited by a marvellous dream. His poems, which are said to have somewhat influenced Milton, are loose paraphrases of Biblical history.

(*c*) *S. Cuthbert* was born near Melrose about 635. At first a shepherd, he afterwards became a monk, and was appointed in 664 Prior of Melrose, and then of Lindisfarne. Thence he retired in a few years to the solitude of Farne, which he rendered fertile. Upon the persuasion of Egfrid of Northumbria he accepted the bishopric of Hexham, and afterwards that of Lindisfarne. This latter see he only held two years, and then again retired to the Isle of Farne. Here he died in the odour of sanctity 687. To his remains for hundreds of years supernatural virtues were ascribed.

6. *Deira, Thanet, Lindisfarne, Jarrow, Wedmore*—what interest attaches to these names?

(*a*) *Deira.*—From this country came the youthful slaves who aroused the pity of Gregory I.

(*b*) *Thanet.*—The Jutes first landed in the Isle of Thanet, the possession of which was subsequently promised to them by Vortigern as payment for military services as mercenaries.

(*c*) *Lindisfarne*, or the Holy Isle (*see* Answer '5 *c*'), is celebrated for its abbey, founded 635. The length of the church alone is 138 ft., and its breadth is 36 ft. It was frequently plundered.

(*d*) *Jarrow* is inseparably connected with the memory of the 'Venerable Bede.' In this parish (S. Paul's) he was born, in the church he was buried; and the chair and stone on which he sat are there yet preserved.

(*e*) *Wedmore* is renowned for Alfred's treaty with Guthrum after the battle of Ethandune, 878.

III.—Model Answers in English.

First Year.

1. Point out the several sentences in the following extract, and the principal parts of each:—

> The rampart is won and the spoil *begun*,
> And *all but* the after carnage done.
>
> Desperate groups of twelve or *ten*
> Make a pause and turn again,
> With *banded* backs against the wall
> Fiercely stand or *fighting fall.*

Analysis.

Sentence.	Kind of Sentence.	Subject.		Predicate.		Object.	
		Simple.	Enlargement.	Simple.	Extension.	Simple.	Enlargement.
The rampart is won	Principal, Simple	rampart	The	is won			
and the spoil begun	Principal, Simple	spoil	the (and)	[is] begun			
and all but the . carnage done	Principal, Simple	all	but the after carnage (and)	[is] done			
Desperate groups of twelve or ten . . . . . or fighting fall	Principal, Simple	groups	desperate, of twelve or ten, fiercely stand . . . . . or fighting fall	make		pause	a
				turn	again		

2. Parse the words in the above extract which are printed in italics.

begun Verb, strong, trans., pass. v., past part., qual. *spoil.*
all Num. adj., used as pers. pron., sing., 3rd, neut., nom., subj. to [*is*] *done.*
but Prep., gov. *carnage.*
ten Num. adj., used as pers. pron., plural, 3rd, com., obj., gov. by *of.*
banded Verb, reg., trans., pass., past part., qual. *backs.*
fighting Verb, strong, intrans., pres. part., qual. *groups.*
fall Verb, strong, intrans., indic., past def., plur., 3rd, agrees with subj. *groups.*

3. What are the Auxiliary Verbs? Explain their use.

An Auxiliary Verb is one that assists a Principal Verb to form voice, mood, tense, or to denote emphasis.

The Auxiliaries are *be, have, shall, will, do* (?).

[N.B.—The Departmental questions often assume that *can, must* are Auxiliaries, whereas they are merely Indeterminate Verbs.]

Be is used to form the Passive Voice, as *to be pleased.*
Have is used to form the Perfect Tense, as *I have loved.*
Shall / *Will* are used to form the Future Tense, as *I shall love.* / *Thou wilt love.*
Do often denotes emphasis, as *Do go away.*

4. Classify pronouns. Make sentences introducing words that are sometimes used as adjectives, and sometimes as pronouns.

(*a*) For classification of pronouns, see p. 42, 'Beach's Elements of English.'

(*b*) '*Adjective-Pronouns*' are very numerous. The most common are :—*One, none, all, any, every, some, each, either, neither, other, another, same, such, few* ; *e.g.* :—

Pronouns.	*Adjectives.*
'*All* will suffer.'	'*All* people that on earth do dwell.'
'Give *each* a bun.'	'*Each* article is numbered.'
'*Others* will know.'	'Try the *other* remedy.'

5. Explain the terms—(*a*) Nominative and (*b*) Objective Cases. (*c*) What different kinds of words are followed by a noun in the objective case? Give examples.

(*a*) The Nominative Case is:—(α) the Naming-form, (β) the Vocative-form, (γ) the Absolute Case, (δ) and the Subject of a Verb.

(α) Chairs, tables, furniture, (β) 'Ye *hills*,' (γ) '*Man* proposes, God disposes.' (δ) '*John* went home.'

(*b*) the Objective Case denotes:—(α) the Object of a Verb, (β) the Object of a Proposition, and (γ) various Adverbial relations.

(α) 'He stole a *cow*,' (β) 'From the *stable*,' (γ) 'He went *home*,' 'It weighed an *ounce*,' 'He died *yesterday*,' 'I smote them *hip* and *thigh*,' etc.

(*c*) (α) Transitive Verbs, (β) Intransitive Verbs taking Cognate Objects, (γ) Verbs of Motion and (δ) Prepositions, and sometimes (ε) Interjections are followed by the Objective Case.

(α) 'John *wrote* a *book*,' (β) 'They have *slept* their *sleep*,' (γ) 'He *reached England*,' (δ) '*At dawn of day*,' (ε) '*Ah, me!*'

6. What do the following terminations mean:— *-ward, -ance, -al, -dom, -ish?* Give examples.

Suffix.	Meaning.	Example.
-ward	in direction of	'The ploughman *homeward* plods.'
-ance	state of	'By him the Lord had wrought *deliverance.*'
-al	quality of	'He was a *musical* genius.'
-dom	dignity, condition	'He rescued the *kingdom* from *thraldom.*'
-ish	savouring of (adjectival) somewhat (adverbial)	'*Foolish* are thy ways.' 'He was of a *dullish* character.'

IV.—Pupil-Teachers for April Examination.

A. *Geography.*
First Year, Ireland, and Physical Geography of British North America.
Second Year, Denmark, Spain, Portugal, Italy, Greece.
Third Year, Africa south of Equator.

B. *History.*
First Year, from 940 to 1066.
Second Year, from 1399 to 1485.
Third Year, from 1748 to 1802.

VI.—GOVERNMENT TEST QUESTIONS.

First Year.

1. Find the G.C.M. of 17,822 and 17,803, and prove it is the G.C.M. Ans. 19.

2. (*Boys.*) By how much is the sum of 2·056 and ·92 greater than their product? Ans. 1·08448.

(*Girls.*) Find, by Practice, how much one man will gain upon another in 5 miles 260 yards, if he gains 22 yards in each quarter of a mile. Ans. 453 yds.

3. (*Boys.*) Find the largest number that will divide 123 and 147 without a remainder ; and find also the smallest number which can be divided exactly by each of the above two numbers. Shew whether 353 is a prime number or not.

The hind and front wheels of a carriage are 8 and 12 ft. in circumference respectively, what is the least distance over which the carriage must travel so that each wheel may have made a complete number of revolutions.

Ans. 3 = G.C.M. ; 6027 = L.C.M. ; 24 ft.

(*Girls.*) How would you prove by a diagram that $\frac{3}{4} = \frac{24}{32}$ and that $\frac{5}{6}$ and $\frac{7}{4} = 1\frac{7}{12}$?

4. Write in Largehand *Uvula, Vestry, Wright, Xerxes, Youthful, Zero.*

Write in Smallhand '*Birds of a feather flock together.*'

5. Analyse the following lines and parse the italicised words :—

There stood proud *forms* around *his* throne,
The stately and the *brave* ;
But *which could fill* the place of *one*—
That one beneath the wave?

6. Verbs in the infinitive sometimes have the word 'to' before them, and are sometimes without it. Explain this, and say when the word 'to' is necessary and when it is not used.

7. Give some account of the river systems of Ireland.

8. Account for the rise and fall of the Nile, giving particulars.

9. Draw a map of the Eastern coast of Scotland, inserting capes, inlets, and ports.

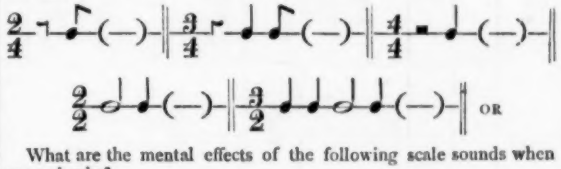
10. Give the dates of *Hadrian's Wall, Offa's Dyke, Danegelt, Origin of Ship Money, Brunanburh,* and *Peace of Olney,* OR of—*Domesday Book, First Crusade, Loss of White Ship, Northallerton, Introduction of Scutage,* and *Assize of Clarendon.*

11. Describe the conversion of Northumberland to Christianity, OR, What do you know of the '*Council of Salisbury*'?

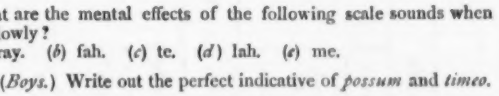
12. Who were Wilfred, Bede, Dunstan, Egbert, and Godwin? OR,
Odo of Bayeux, Lanfranc, Anselm, Becket, and Strongbow?

13. Explain how you would teach Subtraction by the method of '*equal additions.*'

14. Complete each of the following bars by adding one note at the end :—



OR



What are the mental effects of the following scale sounds when sung slowly?
(*a*) ray. (*b*) fah. (*c*) te. (*d*) lah. (*e*) me.

15. (*Boys.*) Write out the perfect indicative of *possum* and *timeo.*

(*Girls.*) Make a calico band three inches in length, put on a button and make a button-hole.

Second Year.

1. (*a*) (*Boys.*) Why is the charge per cent. for Life Insurance different for men of different ages, and why different also frequently for men engaged in different occupations?

(*b*) By selling 48 yds. at 1s. 8d. per yd., a draper gains 4s., what was the cost price per yard, and what was his gain per cent?

Ans. 1s. 7d. ; $5\frac{5}{19}$ p.c.

(*c*) In actual trade the percentage of gain is usually calculated on the selling price, what would be the percentage gained, if so calculated in the above question? Ans. 5 p.c.

PUPIL TEACHERS' ROUTINE FOR JULY, 1894.

DAYS	YEARS	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
		First Lesson	Second Lesson	Third Lesson	First Lesson	Second Lesson	Third Lesson	First Lesson	Second Lesson	Third Lesson	First Lesson	Second Lesson	Third Lesson
MONDAY	1	Analysis and Parsing *or* Latin (See Article)	How to teach Writing	Physical Geography of Rivers	Analysis and Parsing *or* Latin (See Article)	Vulgar Fractions of Wts. & Measrs. Bracketed Vulg. Fractions	Dates from 901 to 975 A.D.	Analysis and Parsing *or* Latin (See Article)	How to teach Arithmetic	Reduc. of Vulgs. to Decimals. Comp. Practice	Composition or Paraphrasing *or* Latin (See Article)	How to teach Spelling	Red. of Decimals to Vulgars. Simple Proportn.
	2		How to teach Farm	Latitude		Percentages. Simple Practice	Dates from 1327 to 1360 A.D.		How to teach Mental Arithmetic	Percentages. Compound Practice		How to teach Number	Misc. Problems
	3			Winds		Compound Practice. Simple Proportion	Dynastic Tables		How to teach Colour	Stocks. Fractions of Money			Square Root. Fractions of Measures
TUESDAY	1	Euclid I. 5. Paper Patterns of Garments	Map of Irish Sea	Scripture *or* Revision	Euclid I. 6. Knitting Sock	Lives of Great Historic Personages	Scripture *or* Revision	Euclid I. 7. Stocking-hole mending	Physical Geography of Rivers	Scripture *or* Revision	Euclid I. 8. Paper Patterns of Garments	Subtr. of Algebra. Stocking-hole mending	Any Geography
	2	Euclid I. 7, 8. Paper Patterns of Garments	Map of Italy		Euclid I. 9, 10, 11. Knitting Stocking			Euclid I. 12, 13. Calico Patch	Longitude		Euclid I. 14, 15. Paper Patterns of Garments	G.C.M. of Algebra. Flannel Patch	
	3	Euclid I. 37, 38, 39. Paper Patterns of Garments	Map of South Africa		Euclid I. 40, 41. Any Needlework			Euclid I. 42, 43. Hedge-tear Darn	Ocean Currents		Euclid I. 44. 45. Paper Patterns of Garments	Simple Equations. Hedge-tear Darn	
WEDNESDAY	1	History from 1012 to 1042 A.D.	Prefixes, Roots, or Affixes *or* Latin	Any Arithmetic	History from 1042 to 1066 A.D.	Any Geography	Mensuration *or* Arithmetic	History of the 'Heptarchy'	Prefixes, Roots, or Affixes *or* Latin	Notes of Lessons	Dates from 795 to 1035 A.D.	Circulating Decimals. Bills of Parcels	Mensuration *or* Domestic Economy
	2	History from 1327 to 1376 A.D.			History from 1370 to 1399 A.D.	Latitude		History from 1410 to 1422 A.D.			Dates from 1399 to 1422 A.D.	Stocks. Vulgar Fractions of Weights	
	3	History from 1649 to 1660 A.D.			History from 1660 to 1678 A.D.	Ocean Currents.		Battles of the Great Rebellion			Constitutional Struggle of the Stuart Period	Stocks. Simple Proportion	
THURSDAY	1	Geography of Scotland	Multip. of Algebra. Paper Patterns of Garments	Latin *or* French	Geography of Australia	History of Roman Period	Drawing	Geography of Australia	Metric System	Latin *or* French	Geography of Ireland	History from Egbert to Canute	Repetition *or* Writing
	2	Geography of Europe	Divisn. of Algebra. Paper Patterns of Garments		Geography of India	History from 1399 to 1410 A.D.		Climates of British Empire			Productions of British Empire	History from 1422 to 1461 A.D.	
	3	Geography of Africa	Algebraic Fractns. Paper Patterns of Garments		Geography of Asia	History from 1678 to 1685 A.D.		Geography of Asia			Geography of Asia	History from 1685 to 1688 A.D.	
FRIDAY	1	Vulgar Frac. of Money, Measures and Multiples	Theory of Music	Drawing	Vulgar Fractions of Measures Any Add. or Sub. of Vulgar Fractns.	Multiplication of Algebra. Knitting Sock	Historical Dates	Multip. of Decimals Easy Multip. of Vulgar Fractions	Vocal Music	Drawing	Circulating Decls. Household Accounts	Map of Ireland	Drawing
	2	Proofs of Required Rules			Miscellaneous Problems	Div. of Algebra. Knitting Stocking		Stocks. Mixed Vulgars and Decimals			Stocks. Vulgar Fractions of Money	Map of Spanish Peninsula	
	3	Miscel. Problems Simple Proportion			Prst. Worth, Disct. Mixed Vulgars and Decimals	Square Root of Algebra. Any Needlework		Stocks. Fractions of Weights			Stocks. Simple Proportion	Map of Mediterranean Sea	

SATURDAY															
	1	French *or* Latin	English from Text Book *or* Latin	Freehand, Perspective *or* Geometry	Science	French *or* Latin	Science	English *or* Latin	Mensuration	French *or* Latin	Literature. Repetition	Examination	French *or* Latin	Science	Examination
	2														
	3														

(*Girls.*) Find the G.C.M. of 27,781 and 23,507, and show that no other number can be their G.C.M. Ans. 2137.

2. (*Boys.*) If the work done by a man, a woman, and a boy, be in the proportion of 3, 2, 1 ; and if 12 men, 15 women, and 15 boys can complete a certain work in 270 days ; in what time would 18 men, 12 women, and 12 boys complete it ? Ans. 243 days.

(*Girls.*) Reduce $\{\frac{3}{7}$ of $5\frac{1}{4}) + (1\frac{5}{9}$ of $10\frac{3}{4})\} \div 10\frac{3}{4}$ to a simple fraction in its lowest terms. Ans. $1\frac{3}{4}$d.

3. (*Boys.*) Two men, A and B, have £1,800 to invest ; A invests in a $3\frac{3}{4}$ per cent. stock at 108, and B in a $2\frac{3}{4}$ per cent. stock at 96 ; compare their incomes from these investments. (*Neglect brokerage.*) Ans. A has £10 18s. 9d. more than B.

(*Girls.*) Reduce $\frac{3}{7}$, $\frac{12}{11}$, $\frac{7}{90}$, $\frac{11}{250}$ to decimal fractions, and explain why the first three produce recurring fractions.
Ans. ·428571 ; 1·72 ; ·07 ; ·044.

4. As in First Year.

5. Paraphrase the following lines and parse the italicised words:—

The day *is done*, and the *darkness*
Falls from the wings of night
As a *feather* is wafted *downward*
From an eagle *in his* flight.

I see the lights of the village
Gleam through the rain and the mist,
And a feeling of sadness comes o'er me,
That my soul *can* not resist.

6. Explain the exact force and meaning of the syllables printed in italic in the following words :—*Pre*eminent, *Preter*natural, Act*ion*, *Vice*-President, Effici*ent*, Respons*ive*, Visi*ble*, *Retro*spect, *Pen*ultimate, Leg*al*.

7. Where and what are :—Poitiers, Delhi, Seville, Surat, Bruges, Singapore, Antwerp, Genoa ?

8. The captain of a ship makes it noon by the sextant, when by the ship's chronometer it is 3.30 p.m. In what longitude is the ship ?

9. Draw a map of the Spanish Peninsula *or* British India.

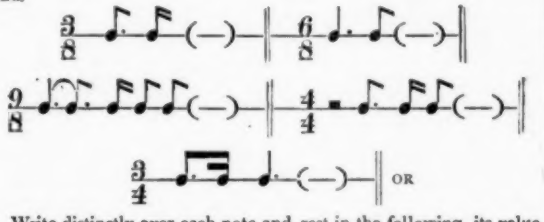
10. Name the Queens of all the Kings from 1307 to 1485.

11. What do you know of Lords Ordainers, Statute of Labourers, Statute of Præmunire, Statute of Uses, and Statute of Fines ? Give dates.

12. What Sovereigns during the period you have studied were under the influence of favourites ? Give particulars.

13. What are the chief devices in summing-up 'Long Tots' ?

14. Complete each of the following bars by adding one *rest* at the end.



Write distinctly over each note and rest in the following, its value in pulses or fractions of a pulse :

| d :m,-,f | s : —. | s.,f :m., | .r :d ||

15. Decline *alter*, *dux*, *jusjurandum*.
Draw half the front, half the back, and one sleeve of a boy's shirt on sectional paper.

16. Construct a triangle, having given the base, one of the angles at the base, and the sum of the two other sides.

THIRD YEAR.

1. Suppose you had to give a first lesson on Fractional Arithmetic, what visible illustrations would it be well to use ? Show also what sort of easy *mental* exercises ought to precede a formal lesson on this subject.

2. (*Boys.*) Explain the terms brokerage, consols are at par, consols are at a discount.

If I sell out £3,000 $3\frac{1}{2}$ per cent. stock at 112, and re-invest in a $4\frac{1}{2}$ per cent. stock at 119, how much do I gain in annual income ?
Ans. £15.

(*Girls.*) Reduce 404 acres 1 rood 23 poles to the fraction of 413 acres 1 rood 37 poles in its lowest terms. Ans. $\frac{39}{41}$.

3. (*Boys.*) A circular race path is 1,078 yds. round ; two men start, back to back, to run round it ; the one runs at rate of 12 miles and the other at $12\frac{1}{2}$ miles an hour ; when and where will they first meet ? Ans. 528 and 550 yds. from start ; $1\frac{1}{2}$ min.

(*Girls.*) If 357 hams, each weighing 19 lbs., can be bought for £399, how many hams weighing 17 lbs. can be bought for £210 ?
Ans. 210 hams.

4. As in First Year.

5. Paraphrase and analyse the following passage :—

Can any mortal mixture of earth's mould
Breathe such divine enchanting ravishment ?
Sure something holy lodges in that breast,
And with these raptures moves the vocal air
To testify his hidd'n residence ;
How sweetly did they float upon the wings
Of silence.

6. Trace to their origin eight of the following words, give their exact meanings, and employ each of them in a sentence of your own :—Methinks, Thoroughfare, Edification, Precipitous, Sinecure, Dormitory, Audible, Centrifugal, Humorous, Commodity, Locomotive, Nutriment.

7. The rivers as well as the lakes of Africa are most unequally distributed over the continent ; most of them have rapids or cataracts in their middle course, and short and ill-developed lower course, and dangerous sandbanks at their mouth.
Prove the above statements by a description of three of its rivers and three of its lakes.

8. Which are the two most regular systems of winds on the globe ? Where do we meet with irregular systems, and with periodical winds ? Say what you know about the last named.

9. Draw a map of the Mediterranean Sea, or of S.E. Australia.

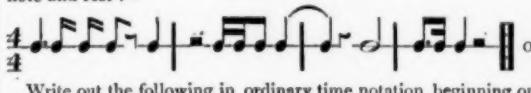
10. What were the chief causes that led to the dethronement of James II. ?

11. Write short lives of Shakespeare and Spenser, or of Addison and Dr. Johnson.

12. For what events were the following years noted :—1497, 1534, 1553, 1611, and 1642, or 1690, 1727, 1757, 1783, and 1805 ?

13. Describe your own practice in explaining the meaning of words which occur in a reading lesson. Is it better to give needful explanations in the course of the lesson or to reserve them to the end ? Give your reason, and say whether you prefer dictionary definitions of words, or brief paraphrases of clauses and sentences, and why ?

14. Rewrite the following in $\frac{4}{2}$ time, doubling the value of every note and rest :—



Write out the following in ordinary time notation beginning on a strong pulse :—

$2\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
m	f	s	REST	l	s	f	m	f	t_1	d	REST

15. In what cases are names of towns placed after verbs of motion to, motion from, and rest in a place ? Give examples, OR,
Cut out and tack together one leg of a child's pair of drawers (three to five years old).

16. Draw a straight line which shall be equal to one given straight line and parallel to another, and be terminated by two given straight lines.

17. (*a*) Solve the equation

$$\frac{7x-15}{9} - \frac{13-3x}{16} + \frac{1}{12} = \frac{11x-55}{72}.$$

Ans. $x = 2\frac{1}{17}$.

(*b*) When the fourth, fifth, and tenth part of a certain number have been taken away from 33 there is no remainder. What is this number ? Ans. 60.

18. The sides of a parallelogram are as 3 : 2, and the angle between them is half a right angle. If the area be ½ sq. ft., find the two sides correct to two decimal places.

Ans. 1·97 ; 1·31 ft.

Describe some of the simplest methods of ventilating a room without causing a draught.

Pupil Teachers' History and Geography (a Correction).—All Pupil Teachers, of whatever year, at their option may be examined at the October Examination *either* in the old History and Geography Syllabus *or* in Division I. of New Code Syllabus. In 1895 the choice will be withdrawn, and 1st Year Teachers will be examined in Division I. of New Code, and 2nd Year and 3rd Year Teachers also. Divisions II. and III. will not affect *any* Teachers until '96 and '97.

COMING MEN.

IX.—MR. ARTHUR A. THOMAS, B.A.

Member of the N.U.T. Executive ; Member of the Committee of the Assistants' Federation ; Member of Executive M.B.T.A. ; Member of Central Committee of Teachers' Benevolent Fund ; Treasurer of the London Federation Committee, &c.

In the north of London, pleasantly situated in a suburb remote from the hum of City life, we find Mr. Thomas busily engaged.

Explaining to him the purpose of our visit, we were at once made comfortable whilst he proceeded to enlighten us upon one or two points connected with his professional position.

Mr. Thomas is a Welshman, being born at Swansea in 1862. As a scholar he attended the Pestalozzian School in that town, and afterwards became a pupil teacher at the Old Parochial School, Swansea. From thence he went, in 1881, to the Training College at Cheltenham. He displays a keen interest in the well-being of his alma mater.

From Cheltenham he returned to Swansea, and was engaged as Assistant Master under the Swansea Board for a period of two years. In 1885 he accepted service under the School Board for London, and was appointed as Assistant Master in the Hargrave Park Board School. Here he is still engaged.

In 1890 Mr. Thomas graduated at the Royal University of Ireland, gaining the Honours distinction in Jurisprudence, Political Economy, and History. Immediately on leaving college Mr. Thomas joined the N.U.T., becoming a member of the Swansea Association, which organisation has recently made good progress. On coming to London he became a member of the Finsbury Association, and at once his energy commenced to display itself. His ability caused him to be elected to the Finsbury Council, and also to the position of Parliamentary Correspondent. In the latter capacity he has organised numerous deputations to Members of Parliament, County Council, and School Board.

Whilst we were engaged in discussing this part of Mr. Thomas' work, he gave us the astonishing information that in London what is commonly known as the 'whiskey money' was utilised for the purpose of reducing the rates. The local branches of the N.U.T. took up this matter, and we were glad to learn have been successful, and that now a portion of the income is devoted to the purpose of Technical Education.

Mr. Thomas is a member of the Press Committee of the Finsbury Association, and was one of the founders of the admirable little organ of that organisation, the 'Finsbury Journal.'

On entering the service of the London School Board Mr. Thomas became a member of the M.B.T.A., and displayed considerable energy during the agitation on the Superannuation question. His ability in this powerful organisation has brought him into prominence, and he was in 1892 elected to the Committee.

We ventured to ascertain Mr. Thomas' opinion upon the possibility of the M.B.T.A. attempting in any way to usurp the functions of the N.U.T., and his reply to our query was:—'So long as the N.U.T. continues its present policy no such step will be dreamt of. It would be foolish to entertain any such proposal. I am strongly opposed to any attempt to establish a Legal Defence Fund in connection with the M.B.T.A. That in connection with the Union is efficient enough for all purposes.'

Further conversation elicited the fact that Mr. Thomas is a pronounced democrat. He believes that the M.B.T.A. should be represented on the London School Board, and strongly approves the proposal to run Mr. Gautrey for the School Board election, as he believes such action would be in the proper democratic direction.

He favoured us with a few observations upon the plan of adopting an Assistant Teachers' 'ticket' in connection with the elections of the Committee of the M.B.T.A. He was satisfied alike with the success of the system and the judicious and fair manner in which it was utilised.

As a representative of the Assistant Teacher, Mr. Thomas is well known. He has actively supported the Assistant Teachers' movement during recent years. His opinion upon the existence of the National Federation of Assistant Teachers is interesting, coming as it does from a Unionist of his standing.

'I have been, and am to-day, alarmed at the large number of assistants who are outside the ranks of the N.U.T., and ever since the inception of the national movement I have conceived that such action as has been taken could have but one result, and that will be to bring every assistant teacher in the country within the Union. It was this realisation which led me at Nottingham, in 1892, to support the proposal by Mr. Moore to establish the Federation, and to again aid the endeavour which was consummated at Derby in 1893.'

In connection with the Assistant Teachers' Federation we learnt that Mr. Thomas is Treasurer to the London Federation Committee, and that he is also a member of the National Federation Committee. He represented the London Assistants at the Conferences of Assistant Teachers held in Nottingham in 1892, and in Derby in 1893.

His connection with the N.U.T. is equally praiseworthy. We have already referred to his connection with the powerful Finsbury Association. His knowledge of Union work, but particularly his natural grasp of Welsh questions, led to his selection as a candidate for the representative of the South Wales District Union on the N.U.T. Executive, and last year he was elected to that responsible position. To the excellence of his work and the close attention which he devotes to it on the Executive of the Union every thorough Unionist can testify. Particularly with respect to the representation of his electors

must we pay a tribute. We can personally bear ample testimony to the fact that on questions especially affecting Welsh teachers the presence of Mr. Thomas on the Executive is of great value.

His counsel and intimate knowledge were of immense service when the Welsh Intermediate Schemes were under discussion. He holds emphatic opinions with respect to the insecurity of tenure possessed by Assistant Teachers in Welsh Intermediate Schools.

Mr. Thomas expressed himself in no uncertain tones upon the refusal of the Privy Council to accede to the request of the N.U.T. Executive to grant the Assistant Teachers of Wales a vote in the election of representatives to the Welsh University Court. He is, however, of opinion that this defect will be remedied.

Mr. Thomas acts as Honorary Secretary to the Welsh Sub-Committee of the Executive of the Union. He represented his Association at the Leeds, Liverpool, and Oxford Conferences of the N.U.T.

At the last-mentioned Conference he succeeded in carrying a resolution with regard to the existence of too large classes in schools. Although considerable opposition had to be met with, he was able to obtain the support of Conference to the agitation he has so long been identified with in the direction of reforming this evil. The recognition in the new Code, though slight, of the necessity for improvement in the matter of adequate staff is in no small measure due to the persistent energy which Mr. Thomas has displayed.

Mr. Thomas is also a Member of the Council of the Benevolent Fund. In addition he is much occupied with press work.

His connection with public and professional questions in the metropolis materially aids him in his position as London correspondent and leader writer to the provincial journals to which he is attached.

He was for some time engaged as a professional expert on the staff of the *Schoolmaster*, and his work for that organ has been of a valuable kind.

Having obtained the above brief summary of the work upon which the subject of our sketch is engaged, we thought it essential that he should, as one of the 'Coming Men,' propound his opinions upon a few of the professional topics of the day.

Yours faithfully
Arthur A. Thomas

In reply to a question bearing upon the present constitution of the Executive of the N.U.T., he said:—'I could use harsh words with respect to certain members. I am of opinion that such individuals as are unable or unwilling to accomplish the great amount of work required should retire and give place to those who are anxious and capable of doing it. I am not in favour of the abolition of Rule 22, as I believe that the dual system of representation, viz., by elected members and district union representatives, has many advantages.'

Mr. Thomas favoured us with the following upon the matter of Union organisation:—'I support the idea of the compulsory formation of district unions throughout the country, as I think such a step would be fraught with material benefit, and it would accomplish what is urgently required, that is, the decentralisation of organisation work, and the influence of the Union would be more publicly felt.'

Further inquiries informed us that Mr. Thomas was in favour of the establishment of a Union rate of wages for members, of intermittent inspection, of a vigorous public agitation with respect to the appointments to the Inspectorate, and of a greater extension of the democratic policy of the Union.

We were much impressed with the enormous amount of labour which our subject was able to perform, and we could not refrain from giving vent to the hope that the members of the Union generally could possess a more intimate knowledge of the devotion and self-sacrifice which such men as Mr. Thomas must render to their cause.

As an advanced Unionist, and as a thoroughgoing educationist, Mr. Thomas impressed us exceedingly. His native humour, his refined expression, coupled with a keen perception, combined to provide us with a conversation in itself a treat. The members of the N.U.T. who wisely look forward for those to whom they can with confidence entrust the responsibility of their great organisation will do well to follow closely the career of this man, who, though yet young in the field, possesses those qualities which are essential for the security of respect and distinction.

(The subject of next month's sketch will be Mr. Shadrach Hicks.)

THE 1894 SCHOLARSHIP EXAMINATIONS.

BY DR. GEORGE BEACH, M.A.,

Author of '*Elements of English*,' '*A Girls' Arithmetic*,' '*Entertaining Readers*,' *etc.*

I.—THE SCHOLARSHIP EXAMINATION will be held on Wednesday, 4th July 1894, at each of the Residential Training Colleges and at many other centres.

Once more we would advise every Candidate who is reasonably well prepared not to miss this chance, for even should he fail both in July and in December next, only one of them will score against him—he will have another try left. Meanwhile he will have obtained excellent practice and invaluable experience.

II. — ADVICE TO CANDIDATES.

i. *Before the Examination.*

1. Every Candidate should be absolutely certain that his seat at the Examination is secure. We knew of one or two embarrassing cases last year through mistake.

2. Don't overtrain. Work no later than 30th June, and then devoutly eschew further study.

3. Acquire, if possible, robust bodily health, mental activity, and cheerfulness of spirits, by means of fresh air, judicious exercise, regular habits, and sufficient rest.

4. Many desirous of entering denominational colleges will have to undergo an examination in Religious Knowledge. Besides the collegiate ones, there are extra centres provided for Church of England Candidates in this subject.

5. Avoid unusual, rich, or indigestible food. During summer the noon dinner often partially incapacitates the student for several hours. The chief meal should be in the evening cool, after cessation of mental exertion.

6. Shun also exciting beverages, late hours, too vivacious or despondent companions; but conserve all your resources, and try to arrive at lucidity of thought, clearness of intellect, and equanimity of mind.

7. Prepare beforehand smallhand, largehand, and map pens, black, red, and blue leads, in addition to penknife and india-rubber.

8. The Examination begins at 10 a.m. Those living afar off should arrive the day previously, and should rather sojourn in the locality than journey to and fro. Railway arrangements are not those of fate, and late trains are responsible for much flurry and many failures.

ii. *At and during the Examination.*

9. 'Above all things' forget not the Examination '*permit*.'

10. Enter the Examination somewhat early, and, if possible, 'head' your Examination Book.

11. Be careful to begin every paper by filling up the official form. Numbers of papers every year remain unidentified through this omission, and the puzzled and plucked Candidate knows not to what to ascribe his calamity.

12. Take pains to give exactly the details of Drawing and Science successes.

13. Sixty marks will be given to those who present University Extension Certificates awarded during the year preceding the Examination by the University of Oxford, University of Cambridge, the Victoria University, or the Universities Joint Board, London, after examination on a course of study including not less than twenty attended lectures or classes.

14. Abandon all book-work between the sittings, refuse to compare answers, and don't fatigue yourself with viewing the 'local lions.'

15. The *Failing Subjects* are Arithmetic, Composition, Domestic Economy, English, Mathematics, Needlework, Penmanship, Reading, School-management, and Spelling.

16. Work the hardest questions if possible, as the answers are of different value. However, rather choose an easy one within your attainments than a more difficult one somewhat beyond them.

17. See that your answers exhibit due thought as to their form, arrangement, and headings.

18. Consider whether a tabulated or literary answer is the most lucid and speedy.

19. Bring out important points by underlining, or by different characters.

20. Punctuate carefully, and take care to use quotation and question marks where necessary. In Parsing underline the quoted words.

21. Writing and Composition must be good throughout all the papers, as the marks awarded for these subjects are estimated on all the exercises.

22. Don't leave out the music, the map, the method questions, or those especially recommended.

23. Writing round a question is not to be thought of. You cannot deceive, but you may exasperate the Examiner.

24. Avoid being funny. It isn't funny to fail.

25. Keep all the smaller rules, such as not writing between the lines. In the arithmetic paper this may be liberally interpreted.

26. Illustrate by diagrams upon the slightest excuse. As a rule insert them to the north-east of the answer.

27. Deductions in Euclid, and intelligent and well-explained arithmetical solutions rank high. Marks are given for portions of mathematical questions.

28. If a Euclid solution or construction be on two pages, draw the figure on both.

29. Rather work an arithmetical problem by algebra than omit it.

30. If the Euclid would take up too much space, double the page and write in two columns.

31. Practise the copy-setting on the scrap side of the paper before writing the actual specimen. Don't 'paint' the letters.

32. Work with your watch on the desk. Don't spend too much time on a single question.

33. First draw the map without much elaboration. If the time permit, you can return to it.

34. In order to prevent an entire problem having to be re-written, revise the mathematics step by step as soon as put down.

35. Always reserve the last few minutes for revision.

36. Don't leave the examination until the last moment. There is always something to be improved.

37. Be honest, in thought, word, and deed. Avoid the very appearance of evil or conniving at deceit. Take no books into the examination.

38. Consult the ease of the Examiner in every possible manner.

39. Candidates may not bring into the examination room any instrument or material for writing except those mentioned in 'Advice 7.'

40. The blotting-paper, supplied by the Inspector, must be left on the desk at the end of each sitting.

III. ROUTINE OF THE SCHOLARSHIP EXAMINATION.

This is not yet to hand, but we shall publish it elsewhere in our columns.

IV. THE EXAMINATION BOOK.

(*a*) Only one book will be supplied for each paper of questions.

(*b*) The left-hand pages are for rough notes and scribbling purposes only.

(*c*) No portion of the book must be torn off.

(*d*) *Above* each answer enter the number of the question in a distinct, bold hand. The question itself need not be transcribed.

(*e*) If the paper be entirely abandoned, write in Largehand upon the front cover of the book the words 'NOT ATTEMPTED.'

The book itself consists of six pages of excellent paper of ordinary foolscap size, with 32 lines per page, and 192 lines in the whole. One-fifth of this is margin, and must not be utilised, but left blank for Examiner's marks. There are thus about 154 full lines, but for convenience sake we will cling to the 192, so that without calculation the examinee may see whether he is exceeding his space allowance.

Subject.	No. of Questions to be answered.	Time allowed.	No. of Lines per answer.	Minutes per Question.	No. of Questions given.
Arithmetic (*Men*)	*13	3 hrs.	15	14	15
Arithmetic (*Women*).	*13	3 hrs.	15	14	15
English, *or*	6	2½ hrs.	32	25	10
Latin	4	2½ hrs.	48	38	4
School Management.	8	2½ hrs.	24	19	12
Music	5	¾ hrs.	Special paper.	9	6
Geography	5	3 hrs.	19	18	7
History	5				7
Euclid	*10	3 hrs.	11	11	10
Algebra	*6				7
Mensuration	1				2
Domestic Economy.	5	2½ hrs.	30	38	14
French	*5	2 hrs.	38	24	5
German	6	2 hrs.	32	20	6
Latin	*7	2 hrs.	27	17	7
Greek	7	2 hrs.	27	17	7
Hebrew	5	2 hrs.	38	24	10
Dictation and Penmanship.	—	20 mins.	—	—	—
Needlework	2	2 hrs.	—	—	4

V. VALEDICTION.

We cannot refrain from most cordially and sincerely wishing all our readers 'God-speed' at the Examination, and subsequently a distinguished and useful professional career.

TO DECEMBER CANDIDATES.

VI. Any July Candidate who feels in the least doubtful of having obtained a high position on the Scholarship List, should not delay a day in getting again to work for the December Examination, the time being so short.

The next Examination will take place on Wednesday, 19th December 1894, and, as aforesaid, all who shall have failed in July will be able to risk another failure without detriment to the 1895 Examination. As only 5½ months intervene between the two 1895 ordeals, the curriculum is a little lightened.

Candidates may omit (1) Outlines of History of English Language and Literature; *or* (2) Remainder of Æneid, Book I., after first 560 lines; (3) All maps except those of the British Isles; (4) Savings and Investments (Domestic Economy).

The Scholarship Syllabus may be obtained gratis and post free from 'The Secretary, Education Department, Whitehall,' and no stamp need be affixed to the requesting letter.

VII. LIST OF BOOKS.

Miscellaneous.—Heller's Code, Stormonth's Dictionary, Dunstan's 'Teacher's Manual of Music,' Hughes's 'Pupil Teacher's Copy Book,' Hughes's 'Art of Handwriting,' Halford-Hawkins' 'Art of Reading and Recitation,' Hughes's 'Constitutional Reader.'

School Management.—Flux's 'Scholarship School Management.'

Geography.—Gregory's 'Physical and Astronomical Geography,' Gregory's 'Physiography,' Brooks's 'Geography,' W. and A. K. Johnston's 'Multum in Parvo' Atlas, Hughes's 'How to draw a Map,' and Blanchard's 'Geographical Notabilia,' Parts I. and II.

History.—Boyd-Carpenter and Green's 'British History,' Boyd-Carpenter and Green's 'Main Facts and Dates of British History,' W. and A. K. Johnston's 'Historical Atlas.'

English.—Dr. Beach's 'Elements of English,' Dawson's 'Paraphrasing,' Nelson's 'Lives of English Authors.'

Arithmetic.—Wollman's 'Teachers' Arithmetic,' Dixon and Beach's 'Arithmetic,' Wollman's 'Metric System.'

Mensuration.—Todhunter's.

Domestic Economy.—Hughes's 'Domestic Economy,' Mrs. Beach's 'Domestic Economy,' Parts I., II., III.

Euclid.—Deighton's; Egan's 'Exercises,' Part I.

The above works are undoubtedly the cheapest and best. They may be readily obtained from any scholastic stationer.

VIII. We have made arrangements, merely to suit our own readers, and with no desire to interfere with existing agencies, for tuition (based upon these Articles, Routines, and Questions) by experienced Teachers and Graduates. Names of intending pupils should be sent direct to Dr. G. BEACH, M.A., *Stanley Mount, Macclesfield.* The fee (to be paid in advance) is 1s. 6d. per week, 5s. 6d. per month, or 15s. 9d. per quarter.

IX. For *Correspondence*, see end of Certificate Article.

GOVERNMENT TEST QUESTIONS.

FIRST WEEK.

1. (*a*) How would you explain Long Division to a class of children who have worked sums in Short Division? (*e.g.* 403 ÷ 19.)
Ans. $21\frac{4}{19}$.

(*b*) By what method would you enable children to ascertain whether a given number is a prime? (*e.g.* 163.)

(*c*) How would you explain to beginners in Fractions that the value of a fraction is not altered by multiplying the numerator and denominator by the same number?

(*d*) Define Proportion, and give a simple method for showing that the product of the extremes is equal to the product of the means.

2. What is the rent of a farm of 179 acres 3 roods 16 poles at £1 3s. 4d. per acre? Ans. £209 16s. 6d.

3. What is the greatest length of which 18 yds. 1 ft. 3 ins. and 20 yds. 1 ft. 9 ins. are multiples? Ans. 3 ft. 3 ins.

4. Reduce $\frac{3}{7}$ of £7 5s. 3d. + $\frac{4}{13}$ of £17 15s. 10½d. + $\frac{5}{17}$ of £1 6s. 11d. to the fraction of £26 19s. Ans. $\frac{1}{2}$.

5. If the carriage of 3 tons 15 cwt. for a distance of 200 miles cost £11 13s. 4d., how much should be charged for the carriage of 7½ cwt. for 125 miles? Ans. 14s. 7d.

6. A bill of £41 2s. 3d. was paid with an equal number of pounds, shillings, and pence; how many were there of each?
Ans. £39, 39s., and 39d.

7. Simplify (*a*) 3·52 ÷ ·005 × 1·03 ÷ ·044; and (*b*) find the value (in yds. ft. in.) of ·0109375 of a mile.
Ans. ·16480; 19 yds. 9 ins.

8. Find the rate per cent. per annum at which £314 12s. 6d. will amount to £346 1s. 9d. in 2⅔ years at simple interest.
Ans. £3 15s. or 3⅜ p.c.

9. A man makes a profit of 2½ per cent. by selling an article for £1 1s. 4½d.; how much per cent. would he make by selling it for £1 1s. 3d. Ans. 2 p.c.

10. If the present worth of £232 17s. 6d., due in a year at 3½ per cent., be invested in a 3½ per cent. stock at 112½, what income will be derived? (*Neglect brokerage.*) Ans. £7.

11. A man embarks his whole capital in four successive ventures; in each of the first two he gained 75 per cent., in each of the last two he lost 33⅓ per cent. Find the ratio of his final to his original capital. Ans. As 136¼ : 100 or As 49 : 36.

12. A, B, C invested £9,410, £3,674, and £5,216 respectively in a business, in which the net profits for a year were £1,448 15s. How should the net profits be divided?
Ans. £744 19s. 2d. A's profits, £290 17s. 2d. B's profits, £412 18s. 8d. C's profits.

13. A cistern can be filled by one pipe A in 30⅓ mins., by another B in 38⅓ mins., and it can be emptied by a third pipe C in 17⅞ mins. If it be empty, and they are all opened together, in what time will the cistern be filled? Ans. 5 hrs. 33⅓ mins.

14. How far may I travel in a coach which goes at the rate of 8 miles per hour, starting at 10 a.m., in order to return on foot to the starting place at the rate of 3½ miles per hour by 32 mins. past 2 p.m.? Ans. 10⅔ miles.

Second Week.

1. Write a short essay on one of these subjects:—
(*a*) Holidays, and the way to use them.
(*b*) Parliament.
(*c*) Tragedy and Comedy.

2. How many separate sentences are there in the following extract? How are they related to each other, and what are the chief parts of each?

Fair laughs the morn, and soft the zephyr blows,
While proudly riding o'er the azure realm
In gallant trim the gilded vessel goes,
Youth on the prow, and Pleasure at the helm,
Regardless of the sweeping whirlwind's sway,
That, hushed in grim repose, expects his evening prey.

3. Paraphrase the following passage:—

I do remember *me*, that in my youth,
When I was wandering upon such a night,
I stood within the Coliseum's wall,
Midst the chief relics of almighty Rome;
And thou didst shine, thou rolling *moon*, upon
All this, and *cast* a wide and tender light
Which softened *down* the hoar austerity
Of rugged desolation, and filled up,
As 't were anew, the gaps of centuries:
Leaving that beautiful which still was so,
And making that which was not.

4. Parse the words printed in italics in the above extract.

5. State how you may know, by the spelling of certain words, that they are probably derived from the Greek language. Give some examples.

6. Explain the origin and the precise meaning of six of the following words, and put each of them in a sentence—
Telephone, Tripartite, Omniscient, Innumerable, Recompense, Philosopher, Quadrilateral, Comprehension, Prosecute, Simulate, Illicit, Cohesion, Legislate.

7. Take any two of the following writers, and say who and what he was, when he lived, and what he wrote:—Hume, Dryden, Burke, Wordsworth.

8. What is meant by a figure of speech? Give some examples of the use of figurative language from poems you have read.

9. Suppose we had an alphabet in which each separate sound was represented by a separate letter; what and how many additional vowels and consonants should we require?

10. Give examples of each of the following, and some rules for its right use:—
The nominative absolute.
The subjunctive mood.
The gerundial infinitive.
The double negative.

Third Week.

1. Write out full notes of a lesson on one of these topics:—
(*a*) The Seasons.
(*b*) (*For infants*). A Shilling.
(*c*) Adjectives, Adjective Phrases, and Adjective Sentences.
(*d*) The Use of Laws.

2. Say what sort of pictorial or other visible illustration you would use in teaching the elements of Arithmetic to very young children, and show what use you would make of such illustrations.

3. Give some simple rules showing the best way of conducting a class lesson in writing.

4. Give a summary of the requirements of the Code in the subject of Geography for the several standards.

5. Show in how many ways you could vary exercises in Mental Arithmetic suited either (*a*) for the upper class in an Infant School, or (*b*) for Standard V.

6. Make a list of object-lessons suited *either* for an infant class or for older children. Show in which of the subjects you would think one lesson sufficient, and to which you would assign two or more lessons.

7. If the following passage occurred in a reading-book, say what explanations you would think it necessary to give, and how you would ascertain that its meaning had been understood:—

At the eastern end of the island was a small densely-wooded peninsula, with a thicket of under-brush so closely matted as nearly to prevent the possibility of seeing across it so long as the leaves remained on the branches. Near the narrow end that connected this acre with the rest of the island, a small block-house had been erected. The logs were bullet-proof, squared and jointed with a care to leave no defenceless points; the windows were loop-holes; the door was heavy and small, and the roof was formed of hewn timber, covered carefully with bark to exclude the rain.

8. Describe the best exercises you know in English Composition, and the best way of correcting them.

9. What are the chief points to be kept in view in teaching the art of reading? Name the advantages, if any, of exercises in silent reading in school.

10. Frame three sets of arithmetical questions suited for scholars in the fourth standard, so as to test knowledge of the reasons of rules as well as the power of applying them.

11. Describe the most healthful and useful exercises in drill which you have seen, and say how you would conduct them.

12. State what use you have made of note-books and exercise-books as a pupil teacher, and how such books ought to be kept.

Fourth Week.

1. Analyse fully the following extracts, and parse the words in italics—

Milton! thou *shouldst* be living at this hour:
England hath *need* of thee; she is a *fen*
Of stagnant waters; altar, sword, and pen,
Fireside, the heroic wealth of hall and *bower*,
Have *forfeited their* ancient English dower
Of inward happiness. *We are* selfish men.

2. Show by above example how analysis helps us to parse correctly.

3. Draw a full map of Wales, marking the rivers, lakes, mountains, principal towns, etc.

4. Explain the phenomenon of the seasons.

5. What were the chief events in Britain during the administration of Suetonius Paulinus and Julius Agricola?

6. Give a short sketch of the British Constitution.

7. What rules have you learnt to observe in giving out Dictation.

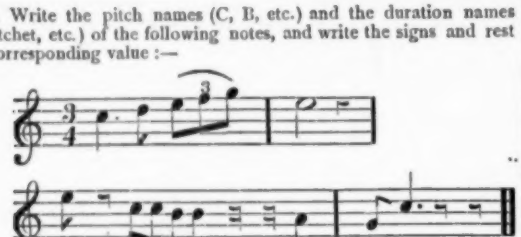
8. Write notes of a lesson illustrating the following passage:—
'The history of our country during the last hundred and sixty years is eminently the history of physical, of moral, and of intellectual improvement.'—*Macaulay.*

SCHOLARSHIP OR FOURTH YEAR ROUTINE FOR JULY, 1894 (MEN AND WOMEN).

SCHOLARSHIP OR FOURTH YEAR ROUTINE FOR JULY, 1894 (MEN AND WOMEN).

DAYS	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Introduction to Algebra — Questions on Needlework	History from 1688 to 1702	Parsing and Analysis	Multiplication of Algebra — Clothing	Dates from 1688 to 1714	Syntax of Nouns and Pronouns	Division of Algebra — Warming the Dwelling	History from 1714 to 1727	Parsing and Analysis	Algebraic Factors — Miscellaneous Arithmetic	Dates from 1714 to 1760	Paraphrasing and Penmanship
TUESDAY	Props. 1 and 2 of Euclid, Book II. — Calico Sampler	General Geography of North America	How to teach Mental Arithmetic	Props. 3, 4, and 5 of Euclid, Book II. — Diagram of Chemise	Revise Geography of England	Rewards and Punishments	Props. 6 and 7 of Euclid, Book II. — Flannel Sampler	Political Geography of the United States	Physical Exercises at School	Props. 9, 10, and 11 of Euclid, Book II. — Calico Sampler	Political Geography of British North America	Mensuration of Squares *or* Clock Sums
WEDNESDAY	Cube Root — Square Root	Tables of Parts of Speech	Mensuration *or* Preparation of Food	Cube Root — Present Worth and Discount	Paraphrasing and Dictation	Mensuration *or* Washing	Cube Root — Stocks	Syntax of Verbs	Mensuration *or* Cleaning the Dwelling	Averages	Greek Roots	Revise Dates
THURSDAY	Addition and Subtraction of Algebra — Functions of Food	History from 1702 to 1714	'La Jeune Sibérienne,' pp. 5 to 9 *or* 'De Bello Gallico,' Chapters 1 and 2	Multiplication of Algebra — Preparation of Food	England under the Romans	French *or* Latin Numerals	Division of Algebra — Clothing and Washing	History from 1727 to 1760	'La Jeune Sibérienne,' pp. 12 to 16 *or* 'De Bello Gallico,' Chapters 2 to 6	Algebraic Factors — Miscellaneous Arithmetic	Saxon England	'La Jeune Sibérienne,' pp. 12 to 19 *or* 'De Bello Gallico,' Chapters 4 to 8
FRIDAY	Revise first 16 Propositions of Euclid, Book I. — Flannel Sampler	General Geography of North America	Practice	Deductions on Euclid, Book I. — Calico Sampler	Map of England (Physical)	Tradesmen's and Household Accounts	Revise Props. 16 to 32 of Euclid, Book I. — Diagram of Chemise	Political Geography of the United States	Measures and Multiples	Deductions on Euclid, Book I. — Flannel Sampler	Map of England (Political)	Revise Geography of England
SATURDAY	French Nouns *or* Latin Declensions	**Examination**	Repetition and Literature	'La Jeune Sibérienne,' pp. 5 to 12 *or* 'De Bello Gallico,' Chapters 1 to 4	**Examination**	Notes in Treble and Bass Clefs *or* The Modulator	Present Worth and Discount	**Examination**	Metric System	French *or* Latin Adjectives	**Examination**	Repetition and Literature

9. Write the pitch names (C, B, etc.) and the duration names (crotchet, etc.) of the following notes, and write the signs and rest of corresponding value :—



Rewrite the following, (*a*) doubling the value of each note and rest, and, (*b*) again, halving the value of every note and rest:—

| m : | r : — | s :—,d' | t.s :d ‖

10. Find, by decimals, the rent of 89 acres 1 rd. 30 pls. at £2 17s. 6d. per acre. Ans. £832 2s. 7·875d.

11. A clerk copied 62·5 instead of ·625 of a certain sum, and the error amounted to £6,187 10s. What was the sum? Ans. £100.

12. Write out clearly and concisely rules for mentally—

(*a*) Finding the value of 40 doz. articles at a given price per article;

(*b*) Multiply a given No. by 375;

(*c*) Dividing a given No. by 75.

13. (*Men only.*) Write out Euclid I. 4.

If the straight lines joining the vertex of a triangle to the points of trisection of the base be equal, the triangle is isosceles.

(*Women only.*) Name and describe fully all stitches used in completing a woman's night-dress.

14. (*Men only.*) Write out Euclid II. 1.

If ABCD is a straight line, prove that the rect. AC, BD is equal to the rectangles AB, CD and BC, AD.

(*Women only.*) What dangers to health are likely to accrue in a school where there are no lobbies or porches for clothing, and where the desks are flat, occupy nearly all the floor space, and face the windows.

15. (*Men only.*) The sides of a quadrangle are 51,140, 148,149 feet respectively, and the angle between the first two is a right angle. Find the area to two places of decimals.

Ans. 1314·06 sq. feet.

(*Women only.*) How would you clean saucepans, bread-tins, and water-bottles?

16. (*Men only.*) Prove that—

$$(x+y+z)^3 - 6xyz = (x+y)^3 + (y+z)^3 + (z+x^3) - x^3 - y^3 - z^3.$$

17. (*Men only.*) Divide—

$\frac{1}{2}a^3 + \frac{3}{2}a^2x - 2x^3$ by $\frac{1}{2}a + x$. Ans. $a^2 + ax - 2x^2$.

EXERCISES IN FRENCH FOR CERTIFICATE EXAMINATION.

I.—Notes on French-English Sight-Tests.

The following are translations of, and notes on, the italicised passages in the French-English sight-tests set in the June number of the 'Practical Teacher,' to which the student is recommended to refer for the context :—

(i.) *Dont on apprécie les effets sans en connaître ni la véritable cause ni la nature.* The effects of which are felt without the real cause or nature being known.

Note.—(*a*) With *dont* the noun (*effets* here) which governs it must be put *after* the verb if that noun is the object of the verb (as in this case). (*b*) That the passive voice is much less frequently used in French than in English. Its place is often supplied in French by the construction with the impersonal pronoun 'on' (as here), or by the use of the reflexive verb; *e.g.*, *Comment se vendent ces pommes?* How are these apples sold? (*c*) The use of the negative *ni* in French contrary to English use. (*d*) The use of the genitive conjunctive pronoun '*en*' before the verb, instead of the possessive adjective before the noun.

Les Grecs connaissaient la propriété que possèdent certains corps d'attirer, après avoir été frappés, d'autres corps légers. The Greeks knew of the property which certain bodies possess, after having been rubbed, of attracting other light bodies.

Note: (*a*) That *que* cannot be nominative case. This construction is a fruitful source of error to students, who translate passages like this by making *que* the subject of the verb instead of the object. The French are fond of keeping the relative or the conjunction *que* close to the verb, with the nominative following the verb. (*b*) That in the passive voice the participle is inflected like an adjective, and the noun qualified must always be thought of, and the participle made to agree with it; thus *frappés* agrees with *corps*. (*c*) That the partitive article here is *d'* and not *des*, although the noun *corps* is plural. Why? Because *autres* is an adjective coming between it and the noun. (*d*) That every preposition in French (except EN) is followed by the *infinitive*, and never by the *participle* (or more correctly the *gerund*), in -ant.

Ils ne tirèrent aucun parti de cette observation. They did not turn this observation to account (or *to practical use*). *Tirer parti* is an idiom.

Pour la première fois. For the first time.

Temps cannot be used for *time* when it means *occasion*.

L'effet qu'il venait de produire. The effect which it had just produced.

Notice this idiom very particularly.

Du premier coup. At the first attempt.

(ii.) *Galvani dut au hasard.* Galvani owed to chance.

This verb *devoir* should be carefully studied, as different tenses have very different meanings.

Est devenu. Has become. *Devenir* conjugates with *être*.

Surpris de voir les membres du cadavre d'une grenouille éprouver des mouvements convulsifs. Surprised to see the limbs of the dead body of a frog manifest convulsive movements.

Qui se trouvait près de l'animal. Which was (or *happened to be*) near the animal.

Note: (*a*) *se trouver* is often used to translate 'to be' when not used as an auxiliary. (*b*) Près *de* not *à*.

Qu'elle se développait d'elle-même. That it was developed spontaneously.

Note the reflexive verb translated by the passive.

(iii.) *Quant aux restes de constructions architecturales qu'on a découverts.* As to the remains of architectural constructions that have been discovered.

Note: (*a*) *découverts* agrees with *que*, the direct object preceding a verb conjugated with *avoir*, and *que* refers to *restes*, which is masculine, and not to *constructions*, which is feminine. If *constructions* had been the antecedent of *que*, we should have had *des* instead of *de*. (*b*) The translation of the construction with '*on*' by the passive.

On ne sait absolument à qui les attribuer. It is not absolutely known to whom to attribute them.

Note: (*a*) That *connaître* could not be used here, because it is a *fact* that is known. (*b*) That *absolument* is formed exceptionally—the *rule* for the formation of adverbs from adjectives being to add *-ment* to the *feminine* form. Collect other exceptions, such as *impunément, aveuglément*.

Il y a si loin de ces ruines aux constructions des Mexicains. There is such a vast difference between these ruins and the constructions of the Mexicans.

Qu'on ne saurait croire. That it cannot be credited.

Note that the conditional present of savoir (viz., *saurait*) is used idiomatically in the sense of *can*, denoting *intellectual* ability.

(iv.) *Le microscope solaire se compose.* The solar microscope *is composed* or *consists*.

Amplifié d'une manière prodigieuse. Magnified in a marvellous way.

Note that *manière* is used with *de*, never with *aux*.

On peut remplacer la lumière du soleil par une lumière électrique. For the light of the sun an electric light can be substituted.

Qui échappent à l'œil nu. Which is invisible to the naked eye.

Note: échapper is intransitive, and requires *à*, not *de*, with its complement.

(v.) *Ses hautes tours d'airain.* Its lofty brass towers.

Les sculptures en bois. The wood carving.

Note.—In French a noun can never be placed before another noun (as in English) to do the work of an adjective. Thus we have above, *d'airain* (of brass), *en bois* (in wood).

(vi.) *Dont les unes sont des citernes, les autres des portiques.* Of which *some* are cisterns, *others* porches.

Plusieurs milliers d'habitants. Several thousands of inhabitants.

Note.—Plusieurs being an adjective, and not an adverb of quantity, does not take the partitive article *de* after it. But *milliers*, a noun expressing a considerable number, requires the part. art. *de* to follow it.

II.—(i.) *Tout importante qu'elle était* = Although it was important.

This is the *concessive* use of *tout*.

Tant qu'on ne trouverait pas le moyen = So long as the means were not found.

Aussi = *Therefore* or *thus* at the beginning of a sentence.

Quoique plusieurs savants aient cru. Although several scholars have believed.

Note that *quoique* is invariably followed by the subjunctive.

Les essais ne répondirent pas à l'attente qu'on avait conçue. The experiments did not come up to the expectation that had been formed.

Note: (*a*) The agreement of the participle *conçue;* (*b*) the translation of the construction with '*on*' by the passive.

À peu près = Very nearly.

(ii.) *Les diverses propriétés de l'air, pesanteur, élasticité, compressibilité* = The different properties of air, viz., weight, elasticity, compressibility.

Note: (*a*) *pesanteur*, etc., could not be governed by *de*, because *de* is always repeated before each complement.

(*b*) The article is omitted before *pesanteur*, etc., because they are in apposition with *propriétés*.

On y parvint au moyen des expériences que permet de faire la machine pneumatique. They succeeded in so doing by experiments which the pneumatic machine admits of making.

Note.—One of the most common errors made by students is to make *que*, when it comes immediatety before the verb, the subject of the verb; whereas *que* can never be the subject. See note above, under I. (i.)

Ce tube adhérait assez fortement. This tube stuck rather tightly.

De cette remarque naquit la première pensée. From this observed fact arose the first thought.

On pût opérer le vide dans un corps creux assez grand pour contenir, etc. = A vacuum might be effected in a hollow body large enough to contain.

(iii.) *Destiné à servir de reservoir* = Intended to serve as a reservoir.

En le plongeant ensuite par l'extremité ouverte. By plunging it afterwards at the open end.

Ce qui s'opère d'autant plus aisément que le vide a été mieux formé = Which is effected the more easily the better the vacuum has been formed.

Note: (*a*) When the relative refers to a sentence instead of a noun or pronoun, it is necessary to precede it by *ce*.

(*b*) The adverbial '*the*' before comparatives is not translated in French. *E.g.*, *the* younger we are, *the* happier we are = '*Plus on est jeune, plus on est heureux.*'

Il faut qu'il ne reste pas d'air dans le tube = No air must remain in the tube.

Note.—Ne pas acts as an adverb of quantity; consequently we find *d'air*, not *de l'air*.

En quelque petite quantité qu'il s'y trouvât = In however small amount it may be present.

Note: (*a*) The subordinate clause dependent on *quelque, quoique, quoi que, quel que*, must be in the subjunctive; hence *trouvât*. (*b*) *se trouver* = to be.

Ce qui amènerait des résultats inexacts = Which would bring about inexact results.

Why *ce* here? See above note on *ce qui s'opère*, etc.

(iv.) *Le liquide dont on se sert le plus communément.* The liquid most commonly used.

Note: (*a*) *Se servir de* = to use; hence *dont*, not *que*.

(*b*) *Communément* is an abverb formed not in accordance with rule. See above note under I. (iii.)

Quand il s'agit d'observations météorologiques. When it is a question of making meteorological observations.

Note the idiomatic phrases:—*De quoi s'agit-il?* = What's the matter? or, What is the point in question? *Il s'agit de votre honneur* = Your honour is at stake.

Au surplus = *Besides*, or, *in addition to this.*

Afin de le rendre plus aisé à distinguer = To make it easier to distinguish.

Note: Rendre must be used here, and not *faire*. Why? Because it is followed by a factitive adjective, *aisé*.

(v.) *Il fallait le secours de l'expérience.* The aid of experimentation was necessary.

(vi.) *Il fit cette expérience* = He performed this experiment.

II.—Translation of English-French Sight Tests.

The following are translations of, and notes on, the passages set for translation into French in the June number of the 'Practical Teacher.'

A.—*First Year Students.*

(i.) Après avoir appliqué la vapeur à la navigation, il était naturel *de* chercher à l'appliquer aux voyages sur terre et au transport des marchandises et des personnes. Il s'agit d'obtenir les mêmes avantages, *économie* de temps et *diminution* de dépense.

Note: (*a*) The infinitive in apposition with the impersonal pronoun *il* is preceded by *de;* but '*that* is easy to do' would be translated 'c'est facile *à* faire;

(*b*) The omission of the article before *économie* and *diminution* because they are in apposition with avantages.

(ii.) Un dessin noir imprimé sur un fond vert perd toute sa vigueur. La noir imprimé sur un fond rouge paraît vert. Dans l'arrangement d'un bouquet, il faut placer les fleurs bleues à côté des orangées, les violettes à côté des jaunes, et entourer les rouges de verdure ou de fleurs blanches.

Note: Adjectives denoting colour follow the noun qualified (as here); but when used figuratively they may precede the noun; *e.g.*, *Une noire melancholie.*

(iii.) Le roi de Syracuse *Hiéron avait fait faire* une couronne d'or. Il soupçonna qu'on avait mêlé à l'or beaucoup d'alliage; il voulut éclaircir le fait. On s'adressa d'abord à divers individus, qui ne purent répondre aux désirs du prince. On eut alors recours à Archimède.

Note: (*a*) Proper names ending in *o* in Latin end in *on* in French. This is because French words are mostly derived from Latin accusatives: *e.g.*, *Platon* from Platonem; *Caton* from Catonem; *Hiéron* from Hiéronem.

(*b*) *avait fait faire* = had had made (lit., had made to make). Compare this with *Il a fait faire un habit neuf* = he had had a new coat made. After faire an active infinitive has a passive meaning.

(iv.) On voit à l'entrée du pont un petit temple creusé dans la roche vive. Deux larges blocs de pierre *en* forment le toit. Une inscription gravée sur le mur nomme l'architecte Lacer; mais rien n'indique à quelle divinité le temple était consacré.

Note the use of *en* before the verb instead of the possessive adjective before toit.

B.—*Second Year Students.*

(i.) On ne saurait trop admirer les excavations d'Éléphanta, quand on considère la difficulté de l'entreprise, le nombre d'ouvriers qu'il a fallu employer, le génie de l'architecte, et tout cela dans un pays que les Grecs et les Romains *traitaient de barbare.* Si ces immenses ouvrages avaient été élevés sur le sol, ils auraient encore le droit d'étonner; mais *ce* qui confond l'imagination, *c'est de penser* que tout ce travail *s'est fait* en creusant pouce à pouce la roche vive.

Note: (*a*) Idiomatic use of *saurait;* (*b*) *traiter de* = to call (implying an insult); (*c*) The repetition of the subject *ce* when it is qualified by an adjective clause; (*d*) The use of the preposition *de* before the infinitive in apposition with *ce.*

(ii.) Un convoi se compose d'une locomotive (on appelle ainsi le wagon qui renferme la chaudière et tout l'appareil), quelquefois de deux, et de plusieurs wagons attelés à la suite l'un de l'autre, et destinés au transport des voyageurs ou des marchandises.

(iii.) De nombreux accidents *sont arrivés*, arrivent tous les jours encore, *tant* sur les bâtiments à vapeur *que* sur les chemins de fer. Nous convenons que *plus d'une* fois ils ont été causés par un défaut de prévoyance ou par quelque accident imprévu; mais souvent aussi *il y a eu* déraillement ou explosion, malgré toutes les précautions prises.

Note: (*a*) *tant . . . que* = *both . . and* correlatives; (*b*) *More than* before a numeral is expressed by plus *de* and not plus *que;* (*c*) that the perfect tense of *y avoir* is il y a *eu*, not *été.*

(iv.) C'est au moyen de la presse hydraulique que l'on parvient à diminuer d'une manière surprenante le volume de certains objets. Nous avons vu des bottes de foin *destinées* à être *embarquées reduites* à la taille et à la forme d'un boulet de canon.

Note (*a*) that *de* is always used with manière, not *dans;* (*b*) the passive participles in italics must be made to agree with bottes.

(v.) L'invention de la poudre, qui *devait* produire un renversement total dans la tactique militaire, ne fut *connue* en Europe que dans le XIV^e^ ou tout au plus dans le XIII^e^ siècle. Nous disons en Europe, car il paraît avéré que les Chinois la *connaissaient* depuis plusieurs siècles, et il est probable que c'est de ce peuple, avec lequel ils eurent jadis des communications, que les Arabes en avaient appris la composition.

Note (*a*) the idiomatic use of the imperfect of *devoir.* Study well the various meanings of the different tenses of this verb. (*b*) The *imperfect* of the indicative of connaître to translate the *pluperfect* in English. Why? Because of the phrase '*depuis* plusieurs siècles' denoting continuation up to that time. Compare 'Il y a trois semaines que nous *sommes* ici' = We *have been* here three weeks.

A.—French-English Sight-Tests.

In the August number of the 'Practical Teacher' the talicised portions will be translated and grammatical explanations and caveats given.

I.—*First Year Students.*

(i.) Roland, neveu de Charlemagne, est mort à Roncevaux, *accablé par la foule des Sarassins* et victime de la jalousie du traitre Ganelon. L'empereur a recueilli à sa cour Berthe, la fille de Roland, qu'il traite comme sa propre fille ; mais *il n'a pu recueillir également* l'autre trésor du héros, *son épée*, la glorieuse Durandal. C'est un Sarrasin, Noéthold, qui la possède, et vient insolemment à Aix-la-Chapelle l'offrir *comme prix d'un combat singulier* à *quiconque pourra le vaincre.*

(ii.) Bacon a dit quelque part : 'Il y a dans le monde trois sortes d'ambition : la première, c'est de régir un peuple, *de le dominer par son ascendant et d'en faire l'instrument de ses desseins ;* la deuxième, c'est d'élever son pays et *de le rendre dominant* parmi tous les autres ; la troisième enfin, et la plus grande, c'est d'élever l'espèce humaine toute entière, et *d'accroître le trésor de ses connaissances.*

(iii.) L'homme n'est pas fait seulement pour connaître et *aimer le beau* dans les œuvres de la nature, il est doué du pouvoir de la reproduire. A la vue d'une beauté naturelle, *quelle qu'elle soit*, physique ou morale, son premier besoin est de sentir et d'admirer. Il est pénétré, ravi, et quelquefois aussi accablé du sentiment de la beauté. Mais quand le sentiment est énergique, il n'est pas longtemps stérile. Nous voulons revoir, nous voulons sentir encore ce qui nous a causé un plaisir si vif, et pour cela *nous tentons de faire revivre la beauté qui nous a charmés*, non pas telle qu'elle était, mais telle que notre imagination nous la représente.

(iv.) Tous les êtres ont leur destination spéciale qui leur est imposée par leur nature, et *parce qu'elle leur est imposée* par leur nature, tous y tendent avec énergie. *Voilà ce que tous les êtres ont de commun.* Mais, cette destination, la plupart l'ignorent en l'accomplissant, et *il n'a été donné qu'a un bien petit nombre* de savoir *qu'ils en ont une.* Ce privilège éminent a été reservé aux natures raisonnables, et *le seul être doué de raison que nous connaissions, c'est l'homme.*

(v.) Le duc alors *fit avancer de nouveau* tous ses archers, et *leur ordonna de ne plus tirer* droit devant eux, mais de lancer leurs traits en haut, pour qu'ils tombassent *par-dessus le rempart du camp ennemi.* Beaucoup d'Anglais furent blessés, la plupart au visage, par suite de cette manœuvre ; Harold lui-même eut l'oeil crevé d'une flèche, mais *il n'en continua pas moins* de commander et de combattre.

(vi.) Un autre besoin se faisait encore sentir. L'histoire n'est pas seulement un spectacle, elle est aussi une leçon. Aprés les grands évènements *qui venaient de bouleverser l'Europe*, on demandait tristement à la science si l'humanité n'est que le jouet du hasard, ou *s'il est, dans le monde moral, des lois auxquelles les nations peuvent désobéir.*

II.—*Second Year Students.*

(i.) Dans les sciences positives, il y a toujours un côté difficile, étranger à la foule même intelligente, et un côté plus ou moins connu et populaire. Seulement, la proportion à cet égard change avec le temps. Ce qui était réservé d'abord au domaine de la science, cent ans plus tard entre dans le domaine public. *Les découvertes montent ; une sommité nouvelle est atteinte par la science*, et reste inaccessible aux notions vulgaires. Ainsi, *quoique la foule s'éclaire, la supériorite scientifique se maintient et s'élève.*

(ii.) Le véritable artiste sent et admire profondément la nature ; mais tout dans la nature n'est pas également admirable. *Ainsi que nous venons de le dire*, elle a quelque chose par quoi elle surpasse infiniment l'art, c'est la vie. Hors de là, l'art peut, à son tour, surpasser la nature, à la condition de ne pas vouloir l'imiter trop scrupuleusement. Tout objet naturel, *si beau qu'il soit*, est défectueux par quelque côté. Tout ce qui est réel est imparfait. *Ici l'horrible et le hideux s'unissent au sublime ;* là, l'élégance et la grâce sont séparées de la grandeur et de la force.

(iii.) La fin de l'art est l'expression de la beauté morale à l'aide de la beauté physique. *Celle-ci n'est pour lui qu'un symbole de celle-là.* Dans la nature, ce symbole est souvent obscur ; l'art en l'éclaircissant atteint des effets que la nature ne produit pas toujours. La nature peut plaire davantage, car, encore une fois, elle possède en un degré incomparable ce qui fait le plus grand charme de l'imagination et des yeux, la vie, l'art touche plus, parce qu'en exprimant surtout la beauté morale il s'adresse plus directement à la source des émotions profondes. *L'art peut être plus pathétique* que la nature, et le pathétique, c'est le signe et la mesure de la grande beauté.

(iv.) Jamais, peut-être, Messieurs, l'homme ne se demanderait pourquoi il a été mis dans ce monde, si les tendances de sa nature y étaient continuellement et complètement satisfaites. Une parfaite, une invariable harmonie entre la pente de ses desirs et le cours des choses laisserait peut-être sa raison éternellement endormie. *Ce qui éveille la raison, ce qui l'oblige à s'inquiéter de la destinée de l'homme, c'est le mal.*

(v.) Le cavaliers retournérent aux redoutes ; mais ils ne purent davantage en forcer les portes ni faire brèche : alors le duc *s'avisa d'un stratagème*, pour *faire quitter aux Anglais leur position* et leurs rangs ; il donna l'ordre à mille cavaliers de s'avancer et de fuir aussitôt. La vue de cette déroute simulée *fit perdre aux Saxons leur sang-froid ;* ils coururent tous à la poursuite, *la hache suspendue au cou.*

(vi.) Les écrivains modernes *s'accordent à donner* au nom des '*Franks*' Ja signification d' 'hommes libres' ; mais aucun témoignage ancien, aucune preuve tirée des racines de l'idiome germanique ne les y autorisent. Cette opinion, *née du défaut de critique*, et propagée par la vanité nationale, *tombe dès qu'on examine* historiquement les différentes significations du nom dont le nôtre est dérivé, et qui, *dans notre langue actuelle*, exprime tant de qualités diverses.

B.—English-French Sight Tests.

I.—*First Year Students.*

Translations, with explanatory notes, will be given of these passages in the August number of the 'Practical Teacher.'

(i.) He said that for twenty centuries royalism and feudalism (*féodalité*) had governed the world, and that the peace he had just concluded was the era (*ère*) of republican government.

(ii.) Bonaparte arrived very simply clad (*vêtir*), followed by his *aides de camp*, all of a stature (*taille*, f.) higher than his, but almost bent (*courber*) by the respect they manifested (*témoigner*) to him.

(iii.) I remained nearly an hour in conversation (*tête à tête*) with Bonaparte ; he listens well and patiently, for he wants to know if what you say to him might enlighten (éclairer) him about (sur) his own affairs.

(iv.) I know that the *Directory* (*Directoire*, m.) spoke of him with respect ; but I also know the influence (*empire*) of the revolutionary laws over those who had made them.

(v.) A reproach (*reproche*, m.) of a much graver nature is the total absence of humanity which General Bonaparte displayed in his Egyptian campaign.

(vi.) When Cæsar overthrew (renverser) the Roman Republic, he had to fight Pompey (Pompée) and the most illustrious patricians of his time ; Cicero and Cato struggled (lutter) against him ; all was grandeur in opposition to his. General Bonaparte met only adversaries whose names are not worth (valoir) the trouble of quoting.

II.—*Second Year Students.*

(i.) I chatted with him once at my father's house, when he was known only as a lawyer of Artois, very extravagant (exagéré) in his democratic principles. His features were ignoble, his complexion pale, his veins of a green colour.

(ii.) By a natural vocation to the state of prince, he was already addressing insignificant questions to all those who were presented to him. 'Are you married?' asked he of one of the guests. 'How many children have you?' of another. 'How long have you been here?' 'When do you depart?' and other questions of this kind, which establish the superiority of him who makes them over him who is willing to let himself be thus questioned.

(iii.) I saw him one day approach a Frenchwoman well known for her beauty, her wit, and the ardour (vivacité) of her opinions ; he placed himself right in front of her like the rudest of German generals, and said 'Madame, I don't like women to meddle in politics.' 'You are right, general,' replied she, 'but in a country where their heads are cut off, it is natural they should desire (avoir envie) to know why.

(iv.) Discouragement had taken possession of (s'emparer de) us ; the younger we were, the less resignation we had ; for in youth especially we (*on*) expect (s'attendre à) happiness.

(v.) On the eve of the fatal day, everyone knew that a blow was about to be struck ; for, in France, people conspire always in public places, or rather they don't conspire ; they excite one another, and he who can listen to what is being said will know beforehand what is going to be done.

(vi.) When Napoleon was at the head of France, he made war to enlarge his empire, that is understood (se concevoir); but, although the Directory desired also to seize on Switzerland as an advantageous military position, its principal aim was to extend the republican system in Europe.

CONVERSATIONAL LESSONS IN CHEMISTRY.

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For particulars of the List of Chemicals and PRACTICAL TEACHER Set of Apparatus for working the experiments referred to in these lessons see numbers for January and February 1893.

LESSON XIV.—ALKALIS.

When we had our lesson on oxides, Charlie, we said there were two main classes of oxides. Yes, sir; you spoke of metallic oxides and non-metallic oxides. Quite so, and I now wish to direct your attention to the former of these two classes. You may remember that some metallic oxides are bases, *i.e.* bodies which have the power of neutralising acids and forming thereby a salt and water, *e.g.*,

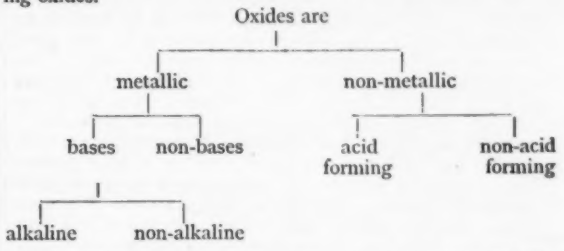
$$CaO + H_2SO_4 =$$

The base, quick lime | neutralises | sulphuric acid | forming

$$CaSO_4 + H_2O.$$

sulphate of calcium and water.

Here are specimens of the metals sodium and potassium. I cut them, and the bright metallic surface almost immediately becomes coated with a white film. What is the film, Annie? It must be rust, sir. But a better name than rust? Oxide, sir; the metal has combined with the oxygen of the air. True. Now place some of the sodium and potassium oxides in water. Very good. We now proceed to examine this solution of the bases potash and soda. How does it feel, Trixie? Just like soap and water. Exactly; and what thought should that put into your minds? Go on, Bob. That soda and potash have to do with soap. Yes; soap is made from fat, and either potash or soda, as we shall see later on. Here is the solution of litmus that was turned red by our acids. Pour some of the potash or soda solution into a sample. Well, Tom? It turns blue, sir. Minnie, now take one of those strips of yellow paper and place it in the solutions. Well? It turns reddish brown, sir. Now we will let Ernest perform a rather more difficult experiment. Into this solution, which is acid, carefully pour some of the potash or soda solution drop by drop, and keep testing with blue litmus paper. As soon as the blue paper no longer turns red, stop. That will do nicely. Now, Charlie, what have we done to the acid? Think for a minute. We have evidently neutralised it, sir. Quite correct; the solution is no longer sour, it will not redden blue litmus; and see, when I pour some into a solution of sodium carbonate we have no effervesence. Hence, as you say, the solution is neutralised. Now take, Arthur, a solution of ammonia, and repeat the whole of the above experiments. In each case you will get the same result exactly. We call the bodies which have these properties alkalis, from an Arabic word, *algali*, which was the name of the plant from which soda was originally obtained. It is to be observed that the solutions that we obtained by adding the oxides to water are chemical solutions, *i.e.*, the oxides do not merely mix with water, but enter into that closest of close unions known as chemical combination. These water compounds are called *hydrates* or *hydroxides*, and it will be wise for you to note carefully the fact that certain non-metallic oxides, when added to water, form acids, and that certain metallic oxides, when added to water, form alkalis, and that between acids and alkalis there is the greatest possible opposition, so that one is effectually neutralised by the other, as in the case above shown. To refresh your memories I have tabulated on the board what I wish you to know respecting oxides.



The table underneath will assist you to keep in mind the four bodies that are properly called

ALKALIS.

Common Name.	Chemical Name.	Formula.	How formed.
Caustic potash	Potassium hydrate or hydroxide.	KOH	By adding potassium oxide (K_2O) to water. $K_2O + 2H_2O = 2KOH$.
Caustic soda	Sodium hydrate or hydroxide.	NaOH	By adding sodium oxide (Na_2O) to water. $Na_2O + 2H_2O = 2NaOH$.
—	Lithium hydrate or hydroxide.	LiOH	By adding lithium oxide (LiO_2) to water. $LiO_2 + 2H_2O = 2LiOH$.
Solution of ammonia.	Ammonic hydrate or hydroxide.	NH_4OH	By adding ammonia (NH_3) to water. $NH_3 + H_2O = NH_4OH$.

The term caustic is from the Greek *kaio*, I burn. Moist KOH and NaOH, if placed on the lips, will cause a painful burning sensation, hence the name caustic alkali.

LESSON XV.—LIME.

The very common, but no less useful, substance, lime, is the body that we shall speak of to-day. To what class of bodies does lime belong, Annie? It is an oxide, sir. Yes; and you may form a correct idea of its formation from a consideration of how K and Na oxidise, for the yellowish metal calcium, of which lime is the rust, or oxide, is even more readily oxidised than Na or K. Shall we find the metal native or free, then? No, sir; it would at once be oxidised whenever it came into contact with air. Right, Frank; and when, after much trouble, the metal has been formed, it has to be preserved in naphtha, or some such substance free from O, or the metal would inevitably decompose the body, and become oxidised. How do you think this very useful substance is formed? No answer. Well, for what is it formed? Now think, and you will certainly tell me that lime is formed from—what, Charlie? From limestone, sir. Certainly; the very name itself is a guarantee for it. Two other

common substances are similar in chemical composition to limestone. Name them, Trixie. Chalk and marble. What is their composition? They are calcium carbonate, sir? Very true; and here is the chemical formula for these three substances—$CaCO_3$. What must be got rid of in order that limestone may become lime? You answer, Arthur. We must get rid of carbon dioxide, sir. By what means can this be done? Will heating do, sir? Let us try. Here is a lump of marble. Put it in the schoolroom fire, and permit it to remain there for about half-an-hour. Then compare it with limestone and with lime, to see with which it most agrees. Whilst the lime is preparing, we will apply a couple of tests to these two bodies. Pour some HCl on some powdered marble. That is right, Willie. Pour the heavy gas into lime water. What do you now know? That the gas is CO_2, sir, because it turns lime water milky. Now sprinkle the lime with water, and let Lionel tell us what takes place. Use your eyes, my boy, and tell us what you see. The lime swells out, sir, and has become more powdery. Quite true. Now feel it. It has turned quite warm, sir, just as when mortar is made. Exactly so, and for the selfsame reason, viz., that chemical combination has taken place, resulting in the formation of what body, Minnie? Come now, you must be able to settle that question. Is it a hydrate that is formed, sir? Yes, it is calcium hydrate—$Ca(OH)_2$. See, now, I place this small portion in this large volume of water. What have I proved, Ernest? That calcium hydrate is soluble in water. True, my boy; and what is the name of this solution of calcium hydrate in water? It is lime water, sir. Yes, the very test for CO_2 that we have just been using. It is worth noting that here we have a notable exception to our rule as to solution, for cold water dissolves more of the hydrate than is dissolved by hot. Now, Bob, take out from the fire the marble that we placed there, and tell us whether it is like lime or limestone. It is like lime, sir, for I have easily made some lime water with it. Good. Next let somebody tell me why lime is so valued. Go on, Philip. It is valuable for mortar-making, sir. I wonder who can make mortar. A little would be useful to consolidate that loose brickwork, so after school you, Frank, can try your hand at the business. There is the lime, what else shall you require? Some sharp sand. Ah, I see you know all about it; but can you tell me what is the use of the sand, and what that of the lime? You give it up, do you? Suppose I tell you that something from the air slowly combines with the soft mortar, and renders it hard; can you tell me what the something may be? No? Well, I had anticipated such an answer; and to help you, I have procured a specimen of old mortar that is almost as hard as the stones that it joins together. Powder it in the mortar, Willie, and put some of the powder in a test tube. To this add some HCl, and observe well the result. Well, Bob? The mortar must be a carbonate, sir, for effervescence takes place, and the gas that comes off makes the lime water turbid. To all that I agree, my boy; and now what is it that the mortar (which of course is calcium hydrate) must take up from the air to turn it into limestone, or calcium carbonate?—for that was the carbonate discovered just now by our friend Bob. Go on, Tom. It must take up carbon dioxide from the air, sir. Of course it must, as the following equation will show:—

$$\underset{\text{Soft mortar.}}{Ca(OH)_2} + CO_2 = \underset{\text{Hard limestone.}}{CaCO_3} + H_2O.$$

What about the sharp sand now, Frank? That is already hard, sir, and it is cemented together to form a kind of concrete. Yes. What have you to say, Arthur? What is cement, sir? That is just what I was coming to. If the limestone be mixed with clay, and then heated to drive off the CO_2, the powdery residue is hydraulic cement, and will set hard, even under water. In this case, also, the setting is due to the re-constitution of the hydrate by combination with CO_2, but it is by no means easy to clearly explain why the presence of the clay should aid so materially in the setting of the calcium hydrate. That it does so is so certain, that by varying the amount of clay, we can hasten or retard the time required for setting, the smaller the proportion of the clay, the longer is the time required to set. It is found in practice that a hydraulic cement requiring a fair amount of time for setting proves the most durable. Well, Charlie, what is your question? What is plaster of Paris, sir? and why does that set? Your question, my boy, hardly fits in here; still, we will answer it. Gypsum is the sulphate of calcium, in combination with two molecules of water, thus—$CaSO_4 . 2H_2O$. If we raise this to a temperature of 120°C., it parts with the whole of its water, and becomes $CaSO_4$ (plaster of Paris). It still, however, retains the power of re-combining with water, so as to again become $CaSO_4 . 2H_2O$, which is a hard, enduring solid. When, therefore, we mix our plaster of Paris with water, we are putting it in juxtaposition with that very body for which it has so great an affinity, to the end that the hard substance gypsum is slowly and effectually formed. Now, then, I dismiss you to your mortar-making, which should be all the more interesting from the knowledge that you now possess of the mode of operation.

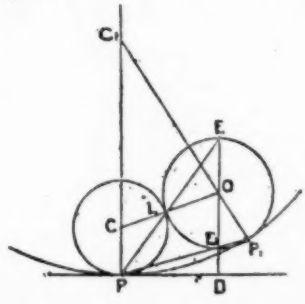
OUR 1894 CERTIFICATE CLASS.

BY DR. GEORGE BEACH, M.A.,

Author of '*Elements of English*,' '*A Girls' Arithmetic*,' '*Entertaining Readers*,' *etc.*

I. Mathematical Hints.

(*a*) Draw two circles to touch a given circle and a given line at a given point.



Let EPE_1L be the given circle with centre O, PD be the given line, and P the given point.

It is required to draw two circles to touch PD in P, and also circle EPE_1L.

Draw PCC_1 at right angles to PD, and from O, EOE_1D perp. to PD and cutting circle in E and E_1.

Join PE and PE_1, cutting circle in L and P.

Draw OL and P_1O, cutting PCC_1 in C and C_1.

Then C and C_1 are the centres of the required circles.

Proof—Case (*a*).

C_1P is parallel to ED (I. 28); $\angle CPL = \angle OEL$ (I. 29); $\angle OEL = \angle OLE$ (Def. 15 and I. 5); $\angle OLE = \angle CLP$ (I. 15); $\therefore \angle CPL = \angle CLP$; $\therefore$ CP = CL (I. 6); $\therefore$ circle PL, of radius CP or CL, touches PD in P (III. 18), and touches circle EPE_1L in L (III. 12).—Q.E.D.

Case (*b*)—

$\angle OP_1E_1 = \angle OE_1P_1$ (Def. 15 and I. 5); $\angle OE_1P_1 = \angle C_1PP_1$ (I. 29); $\therefore \angle OP_1E_1 = \angle C_1PP_1$; $\therefore$ side C_1P_1 = side C_1P (I. 6).

$\therefore$ circle PP_1, of radius C_1P or C_1P_1, touches PD in P (III. 18) and touches circle EPE_1L in P_1 (III. 11).—Q.E.D.

(*b*) (1) In two given circles external to each other inscribe two triangles similar to a given triangle, and having a side of the one in the same straight line as the homologous side of the other; (2) of how many solutions does the problem admit?

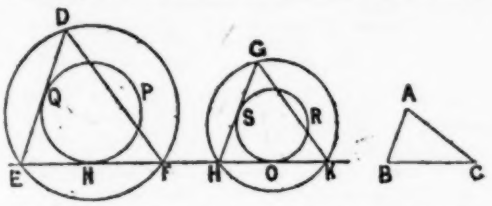
Let ABC be the given triangle, and DEF and GHK the given circles.

From DEF and GHK cut off segments containing an angle equal to A (III. 34).

Let EF and HK be the respective bases.

Draw the concentric circles NPQ and ORS touching the bases EF and HK respectively.

Then every chord of the circle DEF touching the circle ORS will be equal to one another and subtend an angle equal to A.



Draw the line EK touching the circles NPQ and ORS, and cutting the circle DEF in E and F, and cutting the circle GHK in H and K.

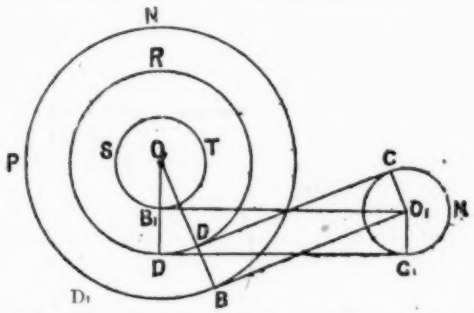
At the points E and H in the straight line EK make the angles FED and KHG equal to B.

Join DF and GK.

Then the triangles DEF and GHK are equiangular to ABC, and EK is a straight line.

(2) Since the two circles are outside one another we can draw four common tangents [see (*c*) infra], and therefore there are as many solutions.

(*c*) To draw to two circles *four* common tangents.



Let RD_1D and CC_1M be two circles; it is required to draw to them *four* common tangents.

Let O and O_1 be the respective centres.

Construction—

From centre O, with radii respectively equal to the difference and sum of OD and OC, describe the circles SB_1T and NPB_1.

From O_1 draw OB_1 and OB respectively tangential to SB_1T and NPB. (There are two solutions in each case.)

Join OB_1 and OB, cutting RD_1D respectively in D_1 and D.

Draw O_1C_1 and OC parallel to OD_1 and OD respectively.

Join CD and C_1D_1.

Then these are *two* of the required tangents, the other *two* being similarly situated towards N and C.

Proof—

$\because$ DB is = and $\parallel$ to O_1C; $\therefore$ DC is = and $\parallel$ to BO_1, and BC is a rectangle.

$\therefore$ $\angle$ ODC and O_1CD are right angles, and CD is a common tangent to RD_1D and CC_1M.—Q.E.D.

Again: B_1D_1 is = and $\parallel$ to O_1C_1; $\therefore$ B_1O_1 is = and $\parallel$ to D_1C_1, and B_1C_1 is a rectangle.

$\therefore$ $\angle$ s OD_1C_1 and OC_1D_1 are right angles, and D_1C_1 is a common tangent to RD_1D and CC_1M.—Q.E.D.

(*d*) The difference between the discount and the interest is $\frac{1}{250}$ of the sum of money discounted, and the rate is 4 per cent. Find the time.

Let t = No. of required years.

At 4 per cent. for 1 year the difference is

$$\left(\frac{4}{100}-\frac{4}{104}\right)\text{ of Principal} = \frac{4}{100\times 104}\text{ of Principal.}$$

Similarly for two years the difference is

$$2\times 4\times\frac{2\times 4}{100\times 108}\text{ of Principal;}$$

$\therefore$ for t years the difference is

$$t\times 4\times\frac{t\times 4}{100\times\{100+(t\times 4)\}}\text{ of Principal;}$$

$$\therefore \frac{1}{250}=\frac{4t\times 4t}{100\times(100+4t)};$$

$$\frac{1}{250}=\frac{16t^2}{10000\times 400t};$$

$$\frac{1}{8}=\frac{16t^2}{1000\times 40t}=\frac{2t^2}{125+5t};$$

$$\therefore 125+5t=6t^2,$$

$$\therefore 6t^2-5t-125=0,$$

$$\therefore (6t+25)(t-5)=0,$$

$$\therefore t=5 \text{ or } -4\tfrac{1}{6}.$$

The latter value being inadmissible. 5 years = Ans.

(*e*)
$$x^4-2x^3+x=380;$$
$$x^4-2x^3+x^2-x^2+x=380;$$
$$(x^2-x)^2-(x^2-x)=380;$$
$$(x^2-x)^2-(x^2-x)+\tfrac{1}{4}=\frac{1521}{4};$$
$$(x^2-x)-\tfrac{1}{2}=\pm\frac{39}{2};$$
$$x^2-x=20, \textit{ or } -19.$$

Again—
$$x^2-x+\tfrac{1}{4}=20+\tfrac{1}{4}, \textit{ or } -19+\tfrac{1}{4}$$
$$=\frac{81}{4}, \textit{ or } -\frac{75}{4}.$$
$$x-\tfrac{1}{2}=\pm\frac{9}{2}, \textit{ or } \pm\frac{\sqrt{-75}}{2}$$
$$\therefore x=5, -4, \textit{ or } \frac{1\pm\sqrt{-75}}{2} \text{ Ans.}$$

(*f*) Sum to n terms—

$$\left(r-\frac{1}{r}\right)^2+\left(r^2-\frac{1}{r^2}\right)^2+\left(r^3-\frac{1}{r^3}\right)^2+\ldots\ldots$$
$$=\left(r^2+2+\frac{1}{r^2}\right)+\left(r^4-2+\frac{1}{r^4}\right)+\left(r^6-2+\frac{1}{r^6}\right)$$
$$+\ldots\ldots$$
$$=(r^2+r^4+r^6+\ldots\ldots r^{2n})-2n+\left(\frac{1}{r^2}+\frac{1}{r^4}+\frac{1}{r^6}+\ldots\frac{1}{r^{2n}}\right)$$
$$=\frac{r^2(r^{2n}-1)}{r-1}-2n+\frac{\frac{1}{r^2}\left(\frac{1}{r^{2n}}-1\right)}{\frac{1}{r^2}-1}$$
$$=\frac{r^2(r^{2n}-1)}{r^2-1}+\frac{\frac{1}{r^2}\left(\frac{1-r^{2n}}{r^{2n}}\right)}{\frac{1}{r^2}(1-r^2)}-2n$$
$$=\frac{r^2(r^{2n}-1)}{r^2-1}+\frac{r^{2n}-1}{r^{2n}(r^2-1)}-2n$$
$$=\frac{r^{2n}-1}{r^2-1}\left(r^2+\frac{1}{r^{2n}}\right)-2n. \quad \text{Ans.}$$

II. Domestic Economy Hints.

Of late years, First Year Students have been allowed to answer seven questions out of twelve set, and Second Year Students seven out of ten set.

The time allowed for the paper is 2½ hours, or 21 minutes per question; and a book of 6 pages containing 192 lines is furnished, thus providing 27 lines per question.

Accordingly there can be no anxiety as regards space or time.

The questions are fairly well spread out over the Syllabus, and there are often one or two questions specially addressed to common sense and practical experience. The Second Year Paper often contains questions upon the First Year Course.

One point, which must touch the hardest heart, is most affecting to note, viz., with what yearning solicitude a paternal (? grandmotherly) Department watches over the lone schoolmistress (always assumed to be dedicated to livelong spinsterhood) brooding over her mental, bodily, and social habits, her meals, her disposal of superabundant cash, and her longevity. Her need of relaxation and holidays is also insisted on.

Respecting all the above points our lady students must be able to solace by their answer a disquieted Department.

The First Year Syllabus is divided into four sections. The first section is arranged under three heads, and a question is nearly always propounded upon each of these.

'Section two' is displayed under five heads, and not infrequently, a question per head (or five for the whole section) is set. In fact *this is the favourite questioning-ground.*

'Section three' is not so well patronised. Dividing itself naturally into five parts, it yet has on occasions only secured one question. *It is undoubtedly the least in vogue.* A corroboration of this opinion is furnished by its omission from the 1895 examination.

The last section is of a quadruple character, and generally is responsible for three queries.

The Second Year Syllabus has five sections. '*Section one' has three branches, which sometimes monopolise six questions out of the ten.* 'Section two' usually provides two questions, and Sections 'three' and 'four' only one each.

Analysis of Questions.

(*a*) *Food, Beverages, Cooking, etc.*:—Questions have been asked respecting the constituents of common articles of food, the value of a fish-diet, non-nitrogenous diets, what diets will produce warmth, fat, vigour, muscle, and bone; the different methods of cooking meat, the evils of bad cooking, defects of ordinary domestic cooking, scientific objects of cooking, teaching of cooking in elementary schools, French *versus* English cooking, penny dinners for school children, several economical family dinners; how to cook herring, mackerel, cod, plaice, potatoes, and beans; how to make bread, beef-tea, mutton-broth, pea-soup, barley-water, Irish stew, plum pudding, and apple pie; different methods of stewing (whether to cook meat or make soup); the impurities of water and their remedies; cookery classes, provision of fuel and apparatus for them, cookery teacher's salary, scheme of lessons for class, materials for demonstration lessons, disposal of cooked dishes, the resulting benefit; scheme of lessons on cottage cookery, on sick cookery, for the stages of Domestic Economy as a 'specific'; the merits of open *versus* closed fire places, the utensils required for class and home cookery; the action of the liver upon food, the qualifications of a good sick nurse, rules for managing a sick-room, etc.

(*b*) *Clothing, etc.*—Information has been requested about the animal and other substances used in dress, their qualities, and the methods of preparing the substances, the need of dress, the needful variations of dress for the various seasons, the fashionable abuses of dress, outfits of dress for schoolmistresses, pupil teachers, servants, etc.; quantities of material for, and cost of dresses; washing of clothes; preparation for washing; machines for washing; order of washing the articles; precautions needed in drying and ironing, the colour of clothes, the arrangements of a laundry; the qualities and uses of borax, soda, ox-gall, chloride of lime, soap, starch, alum, salt, blue, hard and soft water, the temperature of the body, and the necessity for personal cleanliness.

(*c*) *Home, etc.*—Selection of the home, rents, beautifying of the home, requisite furniture, cost of furniture, capacity of the home, its site, aspect, drainage, elevation, water supply, and propinquity to scenes of labour; ventilation, its best methods and ordinary defects; drainage, with special reference to disconnection, sewer-ventilation, and trapping.

(*d*) *Household Management, etc.*—Queries are propounded concerning the outlay of a peasant's or artisan's daily wage, and a small shop-keeper's profits (the number in family being given); respecting lime-washing, colouring, papering, carpeting, oil-cloth; history of vaccination, with arguments *pro* and *con*; causes and symptoms of, precautions to be taken against scarlet and other fevers, cholera, small pox, diphtheria, measles, whooping cough, mumps, ringworm, and other infectious or contagious diseases; the ordinary disinfectants and common antidotes; steps to be taken in case of croup, nose-bleeding, dog-bites, scalds, burns, cuts, wounds, fainting, and broken bones.

(*e*) *Investments and Savings, etc.*—Inquiries are made relating to High Interest and Bad Security, Government and Schools' Savings Banks, Post Office Annuities, Life Insurance, Friendly and Co-operative Societies. Note the alterations recently made in connection with the Post Office schemes.

Three hundred and fifty questions have been threshed out to compile the above analysis.

Much time will be saved by carefully studying Mrs. Beach's 'Domestic Economy,' Parts I., II., III., about 4d. each, before proceeding to larger manuals.

III. Model Answers to History Questions, Dec. 1893.

Women—First Year.

1. What important questions were at issue between the Crown and the Church during the primacies of Anselm and Becket? Date and summarise the attempted settlement known as the Constitutions of Clarendon.

Under the Norman kings there arose a quarrel between the Crown and the Church, which in various forms continued till the reign of John. During the primacy of Anselm the points in dispute were mainly three:—

1. The right of appointment to vacant sees and abbacies.
2. The claim to homage on appointment.
3. The investiture dispute. Of this there were two kinds:—(*a*) lay investiture, which consisted in placing a sceptre or staff in the hands of the new prelate, in token of the King's power over bishops as their feudal lord, and over Church lands as temporalities; (*b*) ecclesiastical investiture by giving him a ring and crosier in token of his connection with the Church in his spiritual capacity. A temporary settlement was arrived at by the Council of London in 1106, by which the King retained the former, but gave up the latter, and by which also he kept the right of nominating new bishops and abbots.

During the primacy of Becket, the struggle took the form of a claim to the rights of the clergy, who had practically emancipated themselves from all civil control. Henry II. desired that both clergy and laity should be subject to the civil courts. Becket, however, maintained that the clergy were amenable only to the spiritual courts, and a Council was called in 1164 at Clarendon, at which were drawn up the famous Constitutions of Clarendon. They were sixteen in number, and provided:—

1. That the clergy should be subject to the secular courts, and that laymen should not be proceeded against in the bishop's court but by legal accusers.
2. That without the King's permission the clergy should not leave the country, nor should his tenants be excommunicated, nor their goods placed under an interdict.
3. That appeals may be made from the spiritual to the secular courts.
4. That bishops should be elected with the King's consent, and before consecration should do homage and fealty to the king for their lands as barons.
5. That villeins be not ordained without the consent of their lord.

2. What makes the following years memorable in English History?—871, 1066, 1100, 1215, 1346, 1588, 1649, 1759.

Dates.	Memorable Events.
871	Accession of Alfred.
1066	(1) Death of Edward the Confessor, and Accession of Harold.
	(2) Invasion of Tostig and Harold Hardrada, and Battle of Stamford Bridge.
	(3) Invasion of the Normans, and the Battle of Hastings.
1100	Death of William II., and Accession of Henry I.
1215	Magna Charta granted.
1346	Battles of Crecy and Neville's Cross.
1588	Defeat of the Spanish Armada.
1649	(1) Trial and Execution of Charles I.
	(2) England declared to be a Commonwealth.
	(3) Massacre of Drogheda by Cromwell's forces.
1759	Capture of Quebec.

3. (*a*) Tell what you know of the career of Simon de Montfort. (*b*) What is the importance of the years 1265 and 1295 in the history of the English Parliament?

(*a*) *Simon de Montfort* was the second Earl of Leicester, his father having received that dignity from King John. He was born in France, but quarrelling with Queen Blanche he retired to England, where he was kindly received by Henry III., who gave him his sister, the Countess-Dowager of Pembroke, in marriage. Henry also appointed him Seneschal of Gascony, but owing to his despotic government there he was recalled, and a violent altercation took place between the King and his subject.

In 1258 he appeared at the Parliament of Oxford at the head of the discontented barons, all armed, and obtained the passing of the ordinances known as the Provisions of Oxford. De Montfort then became head of a new Council of State, and virtual sovereign. The King refusing to abide by the Provisions of Oxford, war broke out, resulting in the triumph of the barons at Lewes in 1264. In the following year De Montfort carried out the first of the Provisions by summoning the Par-

liamentary knights of the shires and burgesses of the boroughs, thus becoming the founder of the House of Commons. In the same year a powerful party was raised up against him among the barons, and at the Battle of Evesham Montfort was defeated and slain by the royal forces under Prince Edward.

(*b*) The years 1265 and 1295 are each important in the history of the English Parliament for the introduction of a new element. In the former year Simon de Montfort issued writs for the election not only of knights of the shire, representatives of whom had probably been sent from the time of King John, but also, which is more remarkable, of representatives of cities and boroughs. From this date these latter were occasionally summoned to Parliament, but they were not permanently engrafted upon Parliament till the year 1295, when Edward I. found that he could obtain large sums of money in this way better than by the custom of levying tallages upon the towns, and especially so when, in 1297, he renounced the right of levying tallages upon the towns. The year 1295 is also memorable for calling up to the national synod representatives of the lower as well as of the higher clergy.

4. Give a concise account of the relations between England and Scotland under the first three Edwards.

One of the chief aims of Edward I. was to complete the unification of Great Britain. In pursuance of this policy, he gladly assumed the *rôle* of arbitrator between the numerous competitors for the Scottish crown, giving his decision in favour of John Baliol. The latter, being made to feel his dependence too keenly, revolted. Thence followed in rapid succession a terrible devastation of Scotland, insurrection of Wallace, the victory of Stirling, the defeat at Falkirk, the capture and execution of the great patriot leader, a fresh revolt, and coronation of Robert Bruce in 1306, and a final expedition against the Scots in 1307, which was cut short by the death of Edward, in the same year, at Burgh-on-the-Sands, near Carlisle.

Edward II. was a man of very different mould from that of his father. Instead of continuing the war with Scotland, he returned to England, and disbanded his forces. Bruce was not slow to take advantage of this, and so great was his success, that Stirling was almost the only fortress left in possession of the English, and this the governor had undertaken to yield if not relieved within a certain time. To do this, Edward raised an army which is said to have numbered 100,000 men, but the great defeat of Bannockburn in 1314 secured the independence of Scotland, and fixed Bruce on the throne of that kingdom. Edward himself only escaped capture by taking shelter in Dunbar, whence he passed by sea to Berwick. Five years later the English King besieged Berwick, but again he failed. Subsequently many forays were made by the Scots into England, the country round was ravaged without opposition, and many towns were given to the flames. But in 1323 a truce for thirteen years put an end to a war which had been the cause of intense misery to the border districts for above twenty years.

In 1328 this truce was exchanged for the Treaty of Northampton, of which the two chief provisions were that Edward III., acting on the advice of Mortimer, acknowledged the complete independence of Scotland, and that all estates belonging to English nobles in Scotland should be restored to them. As the latter condition had not been fulfilled, the malcontents, secretly encouraged by Edward III., put forward Edward, son of John Baliol, as a competitor for the Scotch crown in opposition to David, the young son of Robert Bruce, who had died soon after the conclusion of the treaty in 1328. Baliol quickly won his way to the throne, but was as quickly driven from it again. The Scots renewed their inroads into England, but were defeated at Halidon Hill in 1333. This was followed by the restoration of Baliol, the cession of Berwick, Dundee, Edinburgh, and all the south-eastern counties of Scotland, which were declared to be for ever an appanage of the English Monarchy. The Scots, however, were so dissatisfied with this surrender, that they continued to make inroads into England, to punish which Edward, in 1335 and 1336, led an army into and ravaged the south of Scotland, marched through Athol to Inverness, and on his return burnt the city of Aberdeen. But the cause of Baliol benefited little thereby. The Scots fled to their mountains, and for the third time Baliol was driven from his throne, and took refuge in England. Three years later King David returned to Scotland, and in alliance with France made, in 1342, several incursions into England. Edward was glad to make a truce with him, which lasted till the end of 1344, Baliol being employed to protect the north of England from the forays of the Scottish borderers. In 1346 David, acting as an ally of France, and with a view of compelling Edward III. to raise the siege of Calais, again invaded England with an army of 30,000 men. He was, however, completely defeated at Neville's Cross, and taken prisoner, with many of his nobility. He was detained in captivity till 1357, when he was liberated for a ransom of 100,000 marks. Edward Baliol still bore the title of king, and from him Edward III. bought the crown of Scotland for 5,000 marks, and a yearly pension of 2,000 more. In taking possession of his bargain, he marched through the Lothians, and laid waste the country. But here his career was checked. His fleet, laden with provisions, could not reach Leith, and he was compelled to retreat. He reached England soon after Candlemas, whence this inroad was called 'the burnt Candlemas,' and many an English village was afterwards destroyed by fire in revenge for those which he had kindled in Scotland.

5. What were the causes and consequences of the Rising of the Commons in the reign of Richard II. ?

(*a*) *Causes.*

1. The peasantry, not only in England but in Europe, had long been gradually preparing to strike a blow for freedom, and the system of villenage was tottering to its fall.

2. Discontent throughout the country, owing to (1) the nation being harassed not only by taxation, but by the way in which the taxes had been levied; (2) the treasury being empty, and further taxation necessary; (3) the disasters of the French war. A French fleet had ravaged the English coast, and an English fleet had been defeated by the Spaniards. (4) The unpopularity of the clergy at the absorption by them of all the highest offices of state, and from a fear that some of the money paid by them to the Pope found its way into the treasury of the French king. This feeling found expression in the Statutes of Provisors and Præmunire. (5) The violent proceedings of John of Gaunt, who was suspected of trying to set aside the son of the Black Prince, and make himself king at the King's death.

3. The immediate cause was the imposition of a poll tax on every person in the kingdom of the age of 15 and upwards, and the insult offered by the collector of this tax to the daughter of Wat Tyler.

4. The expenses of the armaments required for the recent French wars.

(*b*) *Consequences.*

1. Great destruction of life and property by the rebels in London and its neighbourhood.

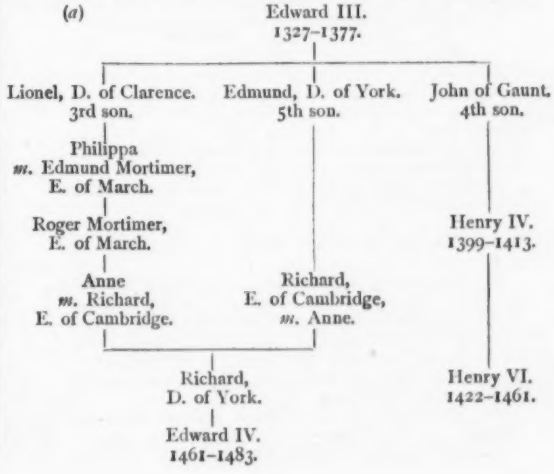
2. Death of Wat Tyler, and execution of the ringleaders, some without even the form of a trial.

3. Temporary reduction of the lower classes to their former slavish conditions, although the revolt marks the beginning of a century of great prosperity among the labouring classes, until at last the serf became a free labourer, and acquired some of the rights of an independent citizen.

4. The constitutional principles of our government became clearly developed. If supplies were voted, it was on condition that they were accompanied by administrative reforms. Parliament was very stern in impeaching the evil advisers of the Crown, and in insisting that the public liberties, secured by statutes and charters, should not be encroached upon.

6. (*a*) Show, by means of a genealogical table, the claims of the rival houses in the Wars of the Roses. (*b*) Name, with their dates, localities, and results, six of the chief battles. (*c*) Tell what you know of the part played in these wars by the Somersets and the Kingmaker.

(*a*)



(*b*)

Battles.	Dates.	Localities.	Results.
St. Albans -	1455	Hertfordshire	Yorkist Victory.
Wakefield- -	1460	Yorkshire	Lancastrian Victory.
Mortimer's Cross	1461	Herefordshire	Yorkist Victory.
Towton - -	,,	Yorkshire	,, ,,
Barnet - -	1471	Middlesex	,, ,,
Tewkesbury -	,,	Gloucestershire	,, ,,

(*c*) During the wars with France, in the former half of the reign of Henry VI., there sprang up two parties, a court party in favour of peace, and an opposition or noblemen's party in favour of war. To the latter belonged Humphrey, D. of Gloucester, and to the former Henry and Cardinal Beaufort, with his two nephews John and Edmund Beaufort, Dukes of Somerset. This party negotiated the marriage of Henry VI. with Margaret of Anjou, who soon gained a complete ascendency over the mind of Henry. In 1447 the Cardinal died, leaving Somerset and Suffolk the most prominent men in the court party, and their influence was further strengthened by the death of Gloucester in prison. Richard, D. of York, heir-apparent to the throne, succeeded Gloucester as leader of the opposition, and was supported by Lord Salisbury and his son the E. of Warwick. The reverses in France, the heavy drain of men and money, the ruin of the wool trade with Guienne, and the desire of others for a minister who could enforce law and order, all tended to create a party anxious to replace Somerset by York, while the personal character and abilities of Warwick, his great wealth and family connections, made him the most powerful noble of his time and a favourite of the people. A family alliance with Richard, D. of York, led him to take the side of the Yorkists, and the story of his life is also that of the Wars of the Roses. He was mainly instrumental in winning St. Albans in 1455, and Northampton in 1460, but was himself defeated at St. Albans in 1461. He was, however, able to compel the Lancastrians to retire to the North, to occupy London, where Edward was at once proclaimed King, and to again defeat his enemies at Towton in 1461. Chiefly through the marriage of Edward with Elizabeth Woodville there sprang up an alienation between him and Edward, which resulted in 1470 in an alliance with Queen Margaret and the marriage of her son with his daughter. Warwick now invaded England with a fresh force, proclaimed and restored Henry VI., and entered London in triumph. But, once more the tide turned; Edward, landing in Yorkshire in 1471, fought the decisive battle of Barnet, in which the great Kingmaker was defeated and slain.

7. Give a summary of the principal events in the progress of the Reformation between 1530 and 1553, noting particularly the chief Parliamentary enactments bearing on the struggle.

1. Petition of the Commons against the Clergy and their Spiritual Courts - - - - - - - Nov. 1529
2. A Book of Articles published by the King - - 1536
3. The Bishop's Book, drawn up by Convocation and embodying the doctrines of the Book of Articles - - 1537
4. The publication of various versions of the Bible 1530–41 (Tyndall's, 1530; Coverdale's, 1536; Matthew's Bible, 1537; The Great Bible, or Cranmer's Bible, 1538, 1539, 1540, 1541).
5. The Statute of the Six Articles, or Bloody Statute - 1539
6. Publication of the 1st Book of Homilies - - 1547
7. Repeal of the Statutes of Rich. II. and Henry IV. against the Lollards, together with all the Acts in matters of religion passed under Henry VIII., except those directed against the royal supremacy - - - 1547
8. Repeal of all the treasons created in the late reign, and the Act which gave royal proclamations the force of law - - - - - - - - - - - - 1547
9. Publication of the Catechism and the First Book of Common Prayer - - - - - - - - 1549
10. The passing of Statutes (*a*) enforcing the observance of fast days and of Lent; (*b*) emancipating the English Clergy from compulsory celibacy; (*c*) commanding all persons to attend Public Worship; (*d*) enacting severe penalties against riotous assemblies, and against those who called the King a heretic, schismatic, tyrant, infidel, or usurper - - - - - - 1549–51
11. Publication of the Second Book of Common Prayer - - - - - - - - - - - 1552
12. Publication of the Forty-two Articles of Religion 1553
13. The passing of Statutes:—
    (*a*) Against levying Annates or first fruits - - 1532
    (*b*) Against appealing to Rome in Ecclesiastical cases - - - - - - - - - 1532
    (*c*) Annulling the Papal authority in England - 1534
    (*d*) Regulating the Succession - - - - - 1536
    (*e*) Declaring the King supreme Head of the Church in England - - - - - - 1535
    (*f*) Suppressing the smaller Monasteries - - 1536
    (*g*) Suppressing the larger Monasteries - - 1539

8. Who were the chief English explorers and colonisers in Tudor and early Stuart times? Give a detailed account of *two* of them.

1. John Cabot, a Venetian.
2. Sebastian Cabot.
3. Sir Hugh Willoughby.
4. Richard Chancellor.
5. Anthony Jenkinson.
6. Martin Frobisher.
7. John Davis.
8. Sir Francis Drake.
9. Thomas Cavendish.
10. Sir John Hawkins.
11. Sir Walter Raleigh.
12. Sir Humphrey Gilbert.

Sebastian Cabot was the son of John Cabot, and born at Bristol in 1477. Commissioned by Henry VII. he made several voyages with his father, and in 1497 was the first European to see the mainland of America. He was one of the first to discover the variations of the needle. Not receiving in England such consideration as he felt due, he went in 1512 to Spain on the invitation of Ferdinand, but after a few years came back to England. After conducting a voyage of discovery he returned to Spain, and in 1526 led an expedition to La Plata. About 1548 he was again in England, and received a pension from Edward VI., being consulted on all questions relating to trade and navigation. He then took an important part in establishing the trade with Russia, but nothing is known either of the year of his death or the place of his burial.

9. In each of the following cases give the date and show the connection with the great contest between the King and the Parliament:—Petition of Right, Trial of Hampden, Triennial Act, Grand Remonstrance, Self-denying Ordinance, Pride's Purge.

Petition of Right - -	1628	Contains the results of the investigation into the King's illegal proceedings, and is known as the "Second Great Charter of English Liberties."
Trial of Hampden -	1637	Roused the nation to a sense of the dangers to which their liberties were exposed by the arbitrary taxation of Charles.
Triennial Act - -	1641	Both secured the regular assembling of Parliament within a given time and prevented a dissolution of Parliament without their own consent for at least 50 days.
Grand Remonstrance -	1641	Was a direct appeal to the people, reciting all the acts of tyranny and instances of misgovernment from the commencement of the reign.
Self-denying Ordinance -	1645	Was Cromwell's device for remodelling the Army by excluding Members of Parliament from all commands, both military and civil, and thereby increasing the power of the Independents, and decreasing that of the Presbyterians.
Pride's Purge - -	1648	Was the outcome and result of the struggle for supremacy between the Presbyterians and Independents.

10. Give an account of the Dutch wars under the Commonwealth (i) and Charles II. (ii). Account for the hostility between the two countries at this time.

Causes:

(1) The contemptuous rejection by the Dutch of Cromwell's overtures for a coalition between the Republics of England

and Holland. The Dutch not only insulted and ill-treated the English envoys, but encouraged Royalist refugees to settle in Holland.

(2) In retaliation the English Parliament determined to restore that naval supremacy which Elizabeth had maintained, but which her successors had allowed to pass away. This they did by enacting the famous Navigation Act, which dealt a death blow to the commerce of the Dutch, who were then the leading carriers of Europe.

(3) The commercial rivalry between England and Holland, the immediate cause being the quarrels of the English and Dutch African Companies concerning the profits from slaves and gold dust in the Guinea trade.

Chief Events:

(i.) *Under the Commonwealth.*

Events.	Date.	Leaders.		Results.
		English.	Dutch.	
(1) Off Dover	1652	Blake	Van Tromp	English victory.
(2) Off Plymouth	,,	Sir G. Aysene	De Ruyter	Indecisive.
(3) In the Downs	,,	Blake	De Ruyter and de Witt	English victory.
(4) Off Goodwin Sands.	,,	Blake	Van Tromp	Dutch victory. Tromp sailed up and down the Channel with a broom at the mast-head as a symbol that he had swept the English from the sea.
(5) Off Portland	1653	Blake	Van Tromp	English victory after three days' fighting.
(6) Off N. Foreland.	,,	Monk and Blake.	Van Tromp	English victory after two days' fighting.
(7) Off the Texel	,,	Monk	—	English victory, Monk killed.

The Treaty of Westminster in 1654 ended the war. The terms were:—

(1) The English flag to be supreme in the narrow seas.

(2) The Dutch to make compensation for injuries done during the war.

(3) Neither country to shelter or assist the foes of the other.

(ii.) *Under Charles II.*

(*a*)

Events.	Date.	Leaders.		Results.
		English.	Dutch.	
(1) Off Lowestoft	1665	Duke of York and Rupert.	Ad. Opdam	Greatest naval victory won by England. Dutch lost 4 Admirals, 18 ships, and 7,000 slain and prisoners.
(2) Off N. Foreland.	1666	Monk and Rupert.	De Ruyter	Dutch victory after four days' fighting.
(3) Off N. Foreland.	,,	Monk and Rupert.	De Ruyter	English victory. Dutch were pursued to their own shores and a large number of their ships were burnt.

Charles appropriated to his own use 2¼ millions voted for the Navy, which consequently fell into an unseaworthy condition. De Ruyter took advantage of this, and sailing up the Thames as far as Gravesend, a part of his fleet entered the Medway and destroyed Sheerness. For weeks the Dutch sailed about the South coasts and then returned home, having inflicted on England the greatest national humiliation she has suffered since the Norman Conquest. The Treaty of Breda in 1667 ended the war.

(*b*)

Events.	Date.	Leaders.		Results.
		English.	Dutch.	
(1) Southwold Bay	1672	Duke of York	De Ruyter	English victory.
(2) Off Dutch coast	1673	Rupert	De Ruyter	Three engagements were fought, of which the Dutch won the last.

The war was ended by the Treaty of Westminster in 1674. The chief terms were:—

(1) The English flag to have supremacy in the narrow seas.

(2) The Dutch to pay a war indemnity of 800,000 crowns.

11. How were the government and the constitution of the country settled by (*a*) the Instrument of Government, (*b*) the Humble Petition and Advice.

(*a*) Upon the expulsion of the Rump Parliament in April 1653, Cromwell formed a Council of State, who summoned 'The Little Parliament,' or Barebones Parliament. This was to sit till Nov. 1654, but after a session of five months they resigned their power into the hands of Cromwell. At the same time they drew up the instrument of Government, which provided—

(1) That the legislative power should rest in a Protector aided by a Council, and in Parliament;

(2) That the Protector should have power to make war and peace;

(3) That Parliament should meet every third year for at least five months;

(4) That if the Protector should veto any Act of Parliament, it should still become law after twenty days.

(*b*) Cromwell, having excluded about 100 of the members of the Second Protectorate Parliament of 1656–8, found the rest subservient to him. They pressed him to accept the title of King, but owing to the opposition of the Army he declined. They then passed 'The Humble Petition and Advice' by which Cromwell was authorized—

(1) To appoint a successor, thus virtually conferring upon him sovereign power;

(2) To assemble a House of Lords.

12. Briefly narrate those events in the establishment of our Indian Empire in which (*a*) Clive and (*b*) Warren Hastings took leading parts. (*c*) How was the Government of India provided for in Pitt's India Bill?

(*a*) *Clive* went to India as a writer, but soon quitted that employment for the army. Being intrusted with the attack on Devicottah, a fort in Tanjore, he performed the duty so well that he was shortly made commissary. The French having artfully obtained considerable territory in the Carnatic, Clive advised that an attack should be made upon Arcot, which being entrusted to him a complete victory was gained. The French tried to retake, but were compelled by Clive to raise the siege. In 1753 Clive visited England, but after a short stay returned to India, and was called upon to march to Calcutta, which had been occupied by Surajah Dowlah. He was again successful, and in the famous battle of Plassy completely routed the Nabob, and firmly established the English power in India. As Governor of Calcutta, Clive did good service, both civil and military, and on his return to England was raised to the peerage with the title of Lord Clive.

(*b*) *Warren Hastings* went to India as a writer, and after fourteen years' residence in Bengal returned to England. He went back again in 1769 as second in Council at Madras, but in two years removed to Calcutta as President of the Supreme Council of Bengal. It was a critical period, and the state of Hindostan soon became perilous from the revolt of the native subjects, the defection of allies, and the increasing power of Hyder Ali aided by the forces of France. In this emergency the Governor-General had to depend solely upon his own exertions, and he succeeded beyond all expectations in saving British India from its enemies, and in strengthening the power of the East India Company at the expense of the native princes.

(*c*) The main feature of Pitt's India Bill of 1784 was the appointment of a Board of Control, consisting of—

(1) Six Privy Councillors nominated by the Crown, and removable at its pleasure;

(2) The principal Secretaries of State and the Chancellor of the Exchequer.

The Act made the appointment of Governor-General and the other chief officers subject to the approval of the Crown, and relieved the Company of its pecuniary embarrassments. It also gave to the Board the supreme control of the civil and military government and of the finances of India.

13. Who were the principal naval commanders in the times of George II. and George III.? Give short sketches of the lives of *two* of them.

John Byng, son of Viscount Torrington (1) - 1663 1757
Geo. Brydes, Lord Rodney (4) - - - 1718 1792

Samuel, Viscount Hood	1724	1816
Augustus, Viscount Keppel	1725	1786
Richard, Earl Howe	1725	1799
James Cook	1728	1799
Adam, Viscount Duncan	1731	1804
John Jervis, Earl St. Vincent	1734	1823
James, Lord Gambier	1756	1833
Horatio, Viscount Nelson	1758	1805
Sir Wm. Sidney Smith	1764	1846
Sir Thos. Hardy	1769	1839
Thos. Cockrane, Earl Dundonald	1775	1860
George, Lord Anson (2)	1697	1762
Edward, Lord Hawke (3)	—	1781

(1) *John Byng*, fourth son of Viscount Torrington, was, like his father, an admiral. After often highly distinguishing himself, he was tried by court-marshal for alleged cowardice. He was sent to the relief of Minorca, then blockaded by the French, and his hesitation to engage an enemy of superior strength excited the clamour of the nation against him. When the news arrived in England, the Ministry, wishing to avert the public odium from their unsuccessful measures, took advantage of the Admiral's unpopularity, and though the court by which he was tried recommended him to mercy, they suffered the sentence to be carried into execution at Portsmouth, March 14th, 1757.

(2) *George, Lord Anson*, was born at Colwich, Staffordshire, 1697, and died at Moor Park, Hertfordshire, 1762. He entered the Navy early, and became captain in 1724, and commodore in 1739. In 1747 he commanded the Channel Fleet, and captured six French men-of-war, two of which were the *Invincible* and *Glory*, which induced the captain, on giving up his sword, to say to the Admiral, 'Sir, you have conquered the *Invincible*, and *Glory* follows you.' For these and other services he was made a peer and a vice-admiral. In 1751 he was appointed First Lord of the Admiralty, and in 1758 he again commanded the Channel Fleet, and was appointed Admiral and Commander of His Majesty's fleets for the purpose of conveying Queen Charlotte from Cuxhaven to England.

14. Make a sketch-map of the Spanish Peninsula, marking the position of Wellington's chief battles and sieges.
See Atlas.

15. Name the great English Writers from 1700 to 1815, giving, in each case, two of the most important works.

Names.	Works.
Isaac Watts, 1674–1748	Version of the Psalms and Hymns; On the Improvement of the Mind.
Alexander Pope, 1688–1744	Essay on Criticism; The Dunciad.
James Thomson, 1700–1748	The Seasons; The Castle of Indolence.
Thomas Gray, 1716–1771	Elegy in a Country Churchyard; Odes.
William Collins, 1720–1756	Odes, the finest in the English language; Oriental Eclogues.
Dr. Samuel Clarke, 1675–1729.	On the Oligations of Natural Religion; Edition of Cæsar's Commentaries.
Joseph Butler, 1692–1752	The Analogy of Religion; Sermons.
John Locke, 1632–1704	Essay on the Human Understanding; Thoughts concerning Education.
Daniel Defoe, 1663–1731	Robinson Crusoe; History of the Great Plague.
Joseph Addison, 1672–1719	Papers in the Tatler, Spectator and Guardian; Cato.
Dr. Samuel Johnson, 1709–1784.	Dictionary of the English Language; Rasselas.
Oliver Goldsmith, 1728–1774.	The Traveller; The Vicar of Wakefield.
William Cowper, 1731–1800	The Task; John Gilpin.
William Wordsworth, 1770–1850.	The Excursion; Sonnets.
Sir Walter Scott, 1771–1832	Lay of the Last Minstrel; Waverley.
Robert Southey, 1774–1843	Madoc; Life of Nelson.
Lord Byron, 1788–1824	English Bards; Scotch Reviewers.

IV.—Answers to June's Mathematics.

A.—First Year, Men, Third Week.

(1) f.
(2) $\frac{a^2+b^2}{a^2-b^2}$; $2a^2$.
(3) $3a^2 - 2ab + b^2$.
(4) $\sqrt{a} - \sqrt{b}$; $\sqrt{5} + \sqrt{2}$.
(5) 39; $\sqrt{3}$; 11 and 8.
(6) $x^3 - 2x^2 - 2x - 1$; $\sqrt{2}(\sqrt{3} - 1)$.
(7) 14, 10.
(8) —.
(9) 3, 9, 15, 21.
(10) 20 miles, 10 a.m.
(11) 16, 9.
(12) 4,020.
(13) 132 yds., 55 yds.
(14) 3, 4, 5.

B.—First Year, Women, First Week.

(1) $1,169\frac{1}{17}$; 160.
(2) 51 tons 15 cwt. 3 qrs. 21 lbs.
(3) £75 7s. $9\frac{3}{4}$d.
(4) £281 5s. 8d.
(5) 116 yds. 1 ft. 11 ins.
(6) 7 horses.
(7) 9·8695877281.
(8) $\frac{3}{20}$.
(9) 15,925; 123.
(10) 266, or 287 yds. from start; $2\frac{1}{2}$ mins.
(11) $3\frac{1}{2}$ per cent.
(12) £14,500.

C.—Second Year, Men, Third Week.

(1) $x + y^2 + z^3 - 3x^{\frac{1}{3}}y^{\frac{2}{3}}$; $\frac{(a^2-x^2)^2}{a^2x^2}$.
(2) $\frac{1}{3}$, $\frac{1}{2}$, 1; 8 or 2, 2 or 8.
(3) —.
(4) $6\frac{1}{2}$d.
(5) —.
(6) —.
(7) 143.
(8) 21.
(9) $\frac{\lfloor n+1}{\lfloor r \lfloor n-r+1}$; $\left(\frac{x}{a}\right)^{2n}$; $2n\left(\frac{x}{a}\right)^{2n-2}$; $n(2n-1)\left(\frac{x}{a}\right)^{2n-4}$; $\frac{\lfloor 2n}{\lfloor n \lfloor n}$
(10) 3·60745.
(11) $P(1+r)^n$.
(12) As 2 : 1.
(13) 16 pipes; As 2 : 1.
(14) 31·06 galls.
(15) 3 cwt. 1 qr. 11 lbs.
(16) £800 18s. 9d.
(17) £276 16s. $8\frac{1}{2}$d.
(18) 35·40092 ozs.

D.—Second Year, Women, First Week.

(1) 840; 4s. 2d.
(2) 4s. 10d.
(3) £25,129 17s. $10\frac{1}{2}$d.
(4) £7 5s. $8\frac{4}{11}\frac{8}{8}$d.
(5) $\frac{23}{987}$; ·4.
(6) ·285 +.
(7) 8 pls. 12 yds.
(8) £504.
(9) £1 6s. 8d., 16s. 0d., 13s. 4d.
(10) £800; £9 17s. 4·792d.
(11) £401 13s. 4d.
(12) 4 per cent.; £9,341 18s. 2d.

(13) $59a^2 - 13ab - 52b^2$; $x^5 + 2x^4 + x^3 - 4x^2 - 11x - 10$.

(14) —.

(15) $\frac{6}{7} \times \frac{b}{a}$; $\frac{a-3b}{a+2b}$; $\frac{a}{(a-2b)^2}$.

(16) 14; $\frac{53}{144}x$; 10.

V. Parsing, Analysis, Paraphrasing, for Routines.

A.—First Year.

(*a*) *First Friday* (Men). 'Coming of Arthur,' Lines 63 to 72 for Analysis. Parse *that, ever, forth, for, most, Colleaguing, Made, crying, he that, hath proven, son, lo!*

(*b*) *First Friday* (Women). 'The Princess,' Canto III., Lines 152 to 160 for Analysis. Parse *He, ceasing, came, afternoon, to take, Would, find, worth, seeing, where, ran, platans.*

(*c*) *Third Monday* (Men). 'Coming of Arthur,' Lines 115 to 125 for Analysis. Parse *voice, as, as, shout, himself, alone, world, brake, flying, Ho! so like, battle.*

(*d*) *Third Monday* (Women). Canto IV. of 'Princess,' Lines 110 to 118 for Analysis. Parse *Knaves, that, tenderness, up, paint, slave, to gain, soul! once, blind, such, be.*

(*e*) *Fourth Monday* (Men). 'Coming of Arthur,' Lines 148 to 157 for Analysis. Parse *King, there, but, each, twice, as, as, I, Merlin, served, so, Bleys, him, magic, laid.*

(*f*) *Fourth Monday* (Women). Canto V. of 'Princess,' Lines 106 to 115 for Analysis. Parse *ran, all, onward, raced, hand, without, parle, that, be fulfilled, him, war.*

B.—Second Year.

(*a*) *First Wednesday* (Men). As in First Year.

(*b*) *First Wednesday* (Women). 'Coriolanus,' Act I., Scene iv., Lines 23 to 29 for Analysis. Parse *fear, but, city, put, proof, than, shields, Titus, mud, thoughts, Which, fellows, for.*

(*c*) *Third Monday* (Men). 'Hamlet,' Act I., Scene ii., Lines 42 to 50 for Paraphrase.

(*d*) *Third Monday* (Women). 'Coriolanus,' Act II., Scene ii., Lines 37 to 48 for Paraphrase.

(*e*) *Fourth Monday* (Men). 'Hamlet,' Act II., Scene ii., Lines 603 to 612 for Analysis. Parse *his, tent, if, but, I, that, may be, to assume, yea, perhaps, as, to damn, this.*

(*f*) *Fourth Monday* (Women). 'Coriolanus,' Act III., Scene iii., Lines 120 to 127 for Analysis. Parse *You, whose, As, loves, carcasses, that, my, here, remain, shake, enemies, nodding.*

(*g*) *Fourth Friday* (Men). 'Coming of Arthur,' Lines 177 to 188 for Paraphrase.

Fourth Friday (Women). 'Coriolanus,' Act IV., Scene iv., Lines 12 to 22 for Paraphrase.

VI.—We have made arrangements, merely to suit our own Readers, and with no desire to interfere with existing agencies, for tuition (based upon these Articles, Routines, and Questions) by experienced Teachers and Graduates. Names of intending pupils should be sent direct to Dr. G. Beach, M.A., *Stanley Mount, Macclesfield.* The fees (to be paid in advance) are 1s. 6d. per paper, 2s. 9d. per month, 8s. 0d. per quarter, or £1 5s. 0d. the course.

SELECTED GOVERNMENT QUESTIONS.

FIRST YEAR.

Second Week.

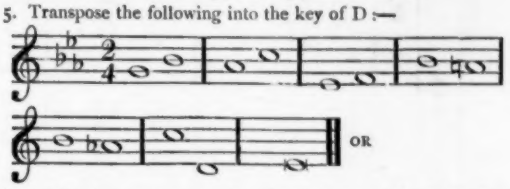
1. Write a large-hand copy of '*Intellectual Atrophy.*'
Write a small-hand copy of 'A spotless mind and innocent.' 'Calls it a hermitage.'

2. Write from Dictation:—
'The cultivation of the attention is the secret of all intellectual training. Attention produces the more or less systematic grouping of representations and ideas, so that not one remains isolated within us, but each rather attracts and awakens similar or logically analogous images and ideas. Inattention, on the other hand, consists in the abortive birth of each representation excited within us, and which dies away without having given rise to a permament grouping. Attention, therefore, is as much a question of method as of natural intellectual power.'

3. Explain Mulhauser's system of teaching writing. Compare the advantages of beginning the teaching of writing with large-hand or text-hand.

4. Write full notes of a lesson on *one* of the following:—The Severn; Methods of Lighting; Money; The Camel.

5. Transpose the following into the key of D:—



The following passage is given in the keys of E, B, C, G, A; **d t, r n d.** Which will sound highest and which lowest?

6. Write notes corresponding in value to the following rests:—

State against each of the following tones of the major scale its relation, as noted by the terms dominant, tonic, etc., **f, d, s, m, l.**

7. State the various kinds of attributive adjuncts that may be employed, and give instances.

8. Analysis and Parsing from Routine.

9. '*The earth is borne along in the heavens by various movements, far more numerous and peculiar than most people would be inclined to suppose.*'
Enumerate these movements. Which of them would you describe to children?

10. Maps from Routine.

11. (*Men only.*) Write Notes of a Lesson on the races of N. America.

(*Women only.*) Write Notes of a Lesson on Arabia.

12. State the chief provisions of the Great Charter which had a permanent interest affecting (*a*) feudalism, (*b*) taxation.

13. Give, with dates, the chief events of the Peninsula War, and describe in detail one of Wellington's battles.

14. (*Men only.*) Enumerate, with dates, the chief events in the struggle between Charles I. and the Parliament.

15. A block of stone weighing 15 tons is composed of 4 substances whose bulks are in the relation of 15 : 13 : 9 : 7; while the weights of a unit of their bulks are as 6 : 7 : 11 : 8. What is the weight of each substance in the block?
Ans. 4 tons 1 cwt. 0 qrs. 12 lbs.; 4 tons 1 cwt. 1 qr.; 4 tons 8 cwt. 1 qr. 16 lbs.; 2 tons 10 cwt.

16. What sum of money put out at $3\frac{1}{2}$ per cent. simple interest for $5\frac{1}{2}$ years will amount to £476 10s. $0\frac{3}{4}$d. Ans. £399 11s. 8d.

17. (*Men only.*) Find the area of a sector of a circle whose radius is 21 feet, the length of arc being 15 feet. Ans. $157\frac{1}{2}$ feet.

(*Women only.*) Show as in making an apron, gathering, setting-in, hemming, and sewing. Put on button, and make button-hole.

18. (*Men only.*) Two adjacent sides of a parallelogram are 1,200 and 860 yards, the perpendicular on the former from the opposite side is 120 yards. Find the perpendicular on the latter from the opposite side. Ans. $60\frac{1}{2}$ yards.

(*Women only.*) If an iron casting, which weighs 5 tons, 11 cwt., 9 lbs., cost £124 11s. $0\frac{3}{4}$d., what will be the weight of a casting that costs £54 16s. $6\frac{3}{4}$d? Ans. 2 tons 2 cwt. 2 qrs. 25 lbs.

19. (*Men only.*) Eliminate x and y from the equations $ay + bx = bh$; $ky + hx = b^2$; $x^2 + y^2 = b^2$. Ans. $a^2 + b^2 = h^2 + k^2$.

(*Women only.*) Give a list of the articles required (with approximate cost of each) to comfortably furnish a working man's cottage.

20. (*Men only.*) A certain fraction becomes $\frac{1}{3}$ if 1 be added to its numerator. If 1 be added to its denominator it becomes $\frac{1}{4}$. What is the fraction? Ans. $\frac{4}{11}$.

(*Women only.*) Explain what is meant by '*inspiration*' and '*expiration.*' Describe the uses of these operations and the organs concerned in performing them.

21. (*Men only.*) Write out Euclid II. 4.
If a straight line be trisected, then four times the square on the whole line is equal to nine times the square on the larger part.

(*Women only.*) When and how does air cease to be '*fresh*'? Explain clearly the effects of a poisoned atmosphere.

22. (*Men only.*) Place a rhombus in a triangle so that all the angular points of the rhombus fall upon the sides of the triangle.

CERTIFICATE ROUTINE FOR JULY 1894 (MEN AND WOMEN, FIRST YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	The effective range of Corporal Punishment and Detention	Study Bacon's Essays, 21, 24, 25 *or* 'Byron,' pp. 58 to 69	Euclid, Book III., Props. 1 to 8 *or* Cost of Clothing	How to secure Good Repetition	Study Bacon's Essays, 27, 28, 29, 30 *or* pp. 191 to 205 of 'Princess' (Notes)	Euclid, Book III., Props. 9 to 15 *or* Composition and Use of Air	Notes of a Lesson on Subordinate Sentences	Analyse, etc. (*See Article*)	Euclid, Book III., Props. 16 to 24 *or* 'Functions of Food'	How to develop 'Observation'	Analyse, etc. (*See Article*)	Euclid, Book I., Props. 1 to 16 *or* Functions of Clothing
TUESDAY	Chief Dates from 1136 to 1272	Harmonical Progression *or* Repair of Underclothing	Means of Communication in N. America *or* Geography of S.E. Asia	Chief Dates from 1272 to 1399	Evolution of Algebra *or* Diagram of a Woman's Chemise	Stocks *or* Percentages	Poetry from 1789 to 1815 *or* Lives of Great Men from 1270 to 1376	Algebraic Surds *or* Any Needlework	Physical Geography of Canada *or* Geography of Central Asia	Chief Dates from 1399 to 1547	Variation and Arithmetical Progression *or* Practise Needlework	Physical Geography of United States *or* Geography of Further India
WEDNESDAY	Present Worth and Discount *or* Practice	Recitation and Penmanship	Equation of Payments *or* Simple Proportion	Stocks *or* Compound Proportion	Simultaneous Simple Equations *or* Recitations	Winds, Currents, and Tides	Any Revision of English *or* Notes on 'Princess,' pp. 206 to end	Problems on Mixed Agents	Problems of Motion (Arithmetic)	Clock Sums	History of 18th Century Literature *or* Any School Management	Recitation and Penmanship
THURSDAY	History from 1800 to 1815	Involution of Algebra *or* Drainage and Water Supply	Trade, Commerce, and Productions of N. America *or* Extent and Population in Asia	History from 1066 to 1135	Algebraic Fractions *or* Composition and Nutritive Value of Food	Causes which affect Climate	Constitutional Affairs from 1660 to 1775	Ratio and Proportion of Algebra *or* Materials of Clothing	Political Geography of Canada *or* Geography of India	History from 1135 to 1216	Simple Equations *or* Furnishing the Home	Political Geography of Northern United States *or* Geography of Turkey in Asia
FRIDAY	Winds, Currents, and Tides	Deductions of Euclid, Book III. *or* Cutting-out of a Pair of Drawers	Analyse, etc. (*See Article*)	Mensuration *or* Fractions	Briefly write out the substance of 'Coming of Arthur' *or* Prologue and two first Cantos of 'Princess'	Rules for Teaching Elementary Freehand Drawing	The Principles of a School Routine and Classification	Euclid, Book II. *or* Furnishing of the Home	Read Introduction to 'Coming and Passing of Arthur' *or* 'Byron,' pp. 70 to end	How to Illustrate Geography from the Scholars' Surroundings	Race Problems	Read 'Passing of Arthur' *or* Introduction to 'Princess'
SATURDAY	Standard Scale of Pitch and Relation of Musical Keys	Examination	Deductions of Euclid, Book I. *or* Construction of the Home	Map of British Columbia *or* Palestine	Quadratics *or* Recitation	Composition on 'Habits form Character'	Deductions of Euclid, Book II. *or* Repair of Underclothing	Chordal Structure of the Common Major Scale	Deductions of Euclid, Book III. *or* Diagram of an Infant's Shirt	Examination	Penmanship	Physical Map of N.W. Territories *or* China	Simultaneous Quadratics *or* Recitation	Composition on 'Self-development is the truest Education'

CERTIFICATE ROUTINE FOR JULY 1894 (MEN AND WOMEN, SECOND YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Notes of a Lesson on Subordinate Sentences	Analyse, etc. (*See Article*)	Euclid, Book III., Props. 16 to 24 *or* 'Functions of Food'	How to develop 'Observation'	Analyse, etc. (*See Article*)	Euclid, Book I., Props. 1 to 16 *or* Functions of Clothing	Study Bacon's Essays, 21, 24, 25 *or* 'Byron,' pp. 58 to 69	Euclid, Book III., Props. 1 to 8 *or* Cost of Clothing	How to secure Good Repetition	Study Bacon's Essays, 27, 28, 29, 30 *or* pp. 191 to 205 of 'Princess' (Notes)	Euclid, Book III., Props. 9 to 15 *or* Composition and Use of Air	Present Worth and Discount *or* Practice
TUESDAY	Poetry from 1789 to 1815 *or* Lives of Great Men from 1270 to 1376	Algebraic Surds *or* Any Needlework	Physical Geography of Canada *or* Geography of Central Asia	Chief Dates from 1399 to 1547	Variation and Arithmetical Progression *or* Practise Needlework	Physical Geography of United States *or* Geography of Further India	Chief Dates from 1136 to 1272	Harmonical Progression *or* Repair of Underclothing	Means of Communication in N. America *or* Geography of S.E. Asia	Chief Dates from 1272 to 1399	Evolution of Algebra *or* Diagram of a Woman's Chemise	Stocks *or* Percentages
WEDNESDAY	Any Revision of English *or* Notes on 'Princess,' pp. 206 to end	Problems on Mixed Agents	Problems of Motion (Arithmetic)	Clock Sums	History of 18th Century Literature *or* Any School Management	Recitation and Penmanship	Recitation and Penmanship	Equation of Payments *or* Simple Proportion	Stocks *or* Compound Proportion	Simultaneous Simple Equations *or* Recitations	Winds, Currents, and Tides	Practice
THURSDAY	Constitutional Affairs from 1660 to 1775	Ratio and Proportion of Algebra *or* Materials of Clothing	Political Geography of Canada *or* Geography of India	History from 1135 to 1216	Simple Equations *or* Furnishing the Home	Political Geography of Northern United States *or* Geography of Turkey in Asia	History from 1800 to 1815	Involution of Algebra *or* Drainage and Water Supply	Trade, Commerce, and Productions of N. America *or* Extent and Population in Asia	History from 1066 to 1135	Algebraic Fractions *or* Composition and Nutritive Value of Food	Causes which affect Climate
FRIDAY	The Principles of a School Routine and Classification	Euclid, Book II. *or* Furnishing of the Home	Read Introduction to 'Coming and Passing of Arthur' *or* 'Byron,' pp. 70 to end	How to Illustrate Geography from the Scholars' Surroundings	Race Problems	Read 'Passing of Arthur' *or* Introduction to 'Princess'	Winds, Currents, and Tides	Deductions of Euclid, Book III. *or* Cutting-out of a Pair of Drawers	Analyse, etc. (*See Article*)	Mensuration *or* Fractions	Briefly write out the substance of 'Coming of Arthur' *or* Prologue and two first Cantos of 'Princess'	Rules for Teaching Elementary Freehand Drawing
SATURDAY	Chordal Structure of the Common Major Scale	Deductions of Euclid, Book III. *or* Diagram of an Infant's Shirt	Examination	Penmanship	Physical Map of N.W. Territories *or* China	Simultaneous Quadratics *or* Recitation	Standard Scale of Pitch and Relation of Musical Keys	Examination	Deductions of Euclid, Book I. *or* Construction of the Home	Map of British Columbia *or* Palestine	Quadratics *or* Recitation	Composition on 'Habits form Character'	Deductions of Euclid, Book II. *or* Repair of Underclothing	Composition on 'Self-development is the truest Education'

CERTIFICATE ROUTINE FOR JULY 1894 (MEN AND WOMEN, SECOND YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Jevons' Logic, pp. 22 to 37 *or* Cartwright's 'Mental and Moral Science'	Read Notes of 'Hamlet,' Act V. *or* Notes of 'Coriolanus,' Act II.	Euclid, Book VI., first 8 Props. *or* Practise Darning	School Registers	Study First Half of Notes to 'Passing of Arthur' *or* 'Spenser,' Chapter I.	Euclid, Book VI., first 17 Props. *or* Tucking, Whipping, Feather-Stitching	Notes of a Lesson on 'The Eye: its structure and uses'	Deductions on Euclid, Book VI. *or* Linen Patch	Paraphrase (*See Article*)	'Quick,' Chapter XVIII.	Euclid, Book II. *or* Print Patch	Analyse, etc. (*See Article*)
TUESDAY	As in First Year *or* History from 1547 to 1564	Mensuration *or* Stocks	As in First Year *or* Geography of Scotland	As in First Year *or* From 1584 to 1603	Race Problems *or* Any Arithmetic	As in First Year *or* Geography of Ireland	As in First Year *or* Great Men from 1530 to 1584	Mental Arithmetic	As in First Year *or* Political Geography of Australia	As in First Year *or* Irish Affairs from 1485 to 1603	Theory of Proportion	As in First Year *or* Commercial Geography of Australia
WEDNESDAY	Analyse, etc. (*See Article*)	Simultaneous Simple Equations *or* Food for the Sick	Peculiarities of Shakespeare's Grammar	Read Bacon's Essays, 32, 36, 38 *or* Notes of 'Coriolanus,' Act III.	'Quick,' Chapter XVII.	The Algebraic Progressions *or* Apportionment of Small Incomes	Mensuration *or* Any Revision	Jevons' Logic, pp. 37 to 53 *or* Cartwright's 'Mental and Moral Science'	Algebraic Interest *or* Best time to purchase Household Requisites	Jevons' Logic, pp. 53 to 69 *or* Cartwright's 'Mental and Moral Science'	Algebraic Annuities *or* Disinfectants	History as in First Year *or* Any School Management
THURSDAY	As in First Year *or* From 1564 to 1584	Compound Proportion	As in First Year *or* Political Map of Australia	As in First Year *or* Dates from 1530 to 1558	Compound Interest	As in First Year *or* Physical Geography of Australia	As in First Year *or* Foreign Policy of the Tudors	Problems of different agents (A, B, C, etc.) and of running taps	As in First Year *or* Manufactures of Scotland and Ireland	As in First Year *or* Great Men from 1584 to 1603	Stocks	As in First Year *or* Geography of New Zealand
FRIDAY	Binomial Theorem *or* Nourishing Foods for Convalescents	Deductions on Euclid, Book I. *or* Diagram of Muslin Pinafore	The Educational value of Drawing and its relation to Writing	Permutations *or* Benefit Clubs, Building Societies, etc.	Deductions on Euclid, Book II. *or* Cutting-out of a Muslin Pinafore	Mensuration *or* Division into Proportional Parts	Combinations *or* Slight Wounds and Accidents	Euclid, Books II. and IV. *or* Give the measurements of the required garments	Read Bacon's Essays, 39, 50 *or* 'Spenser,' Chapter II.	Mensuration *or* Infection and Contagion	Principles of Euclid, Book V. *or* Describe how to cut out a Boy's Shirt	Paraphrase (*See Article*)
SATURDAY	Transcription from one time to another	Examination	Describe the characters of 'The King' and 'The Queen' *or* of 'Virgilia'	As in First Year *or* Physical Map of Australia	Study the Code	Grammar of 'Hamlet' *or* 'Coriolanus'	Repetition, Literature, and Penmanship	Compass and registers of Voices	Mensuration *or* Proofs of Rules	Examination	Penmanship	As in First Year *or* Map of New Zealand	Mensuration *or* Any Revision	Repetition, Literature, and Penmanship

Fourth Week.

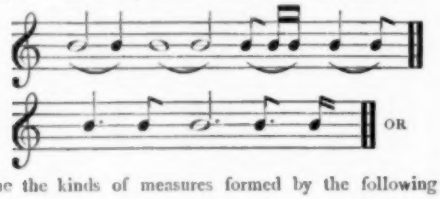
1. Write a large-hand copy of '*Psychic Consciousness.*' Write a small-hand copy of '*Order is Heaven's first law.*'

2. Write from dictation :—'Once the mind is capable of receiving and acquiring, we have to determine the best form of intellectual food, and the quality and quantity of knowledge to be acquired. There is a vast difference between the ingestion and digestion of food, between cramming the memory and assimilation. The choice of intellectual food must be regulated by the nature of the individual brain. We have to introduce the maximum of elementary nutriment into the cerebral circulation with the minimum of waste.'

3. By what excercises may rapidity of computation in Arithmetic be most effectually promoted? How may accuracy of work be secured? What are the chief difficulties to be surmounted in giving a first lesson on decimals?

4. Describe the best method with which you are acquainted of teaching children to draw maps. How would you vary your directions in teaching them to draw maps of England, Russia, and Australia?

5. Rewrite the following, using tied notes to express the value of the dots, and dots to express the value of the tied notes :—



Name the kinds of measures formed by the following pulse signs :—

(*a*)

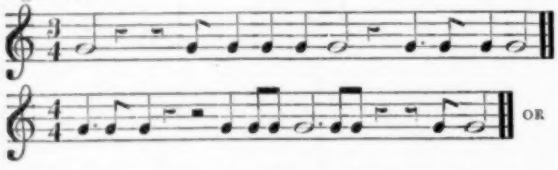
| :s | l .s :f .m | r :—.m | d : ‖

(*b*)

| :s | — : | m :—.,m | d : ‖

(*c*)

| m :—.d :f | m :—.s :l.s | f,m.r:d : ‖

6. Bar the following passages in accordance with the Time Signatures :—

Write in figures over the following, the value (as one pulse, ½ pulse, etc.) of each note and rest :—

| s :—.l:s.f | m : — : — | .s :l.,t:d' | s.f,m:r. : ‖

7. Point out some peculiarities of style in the language of Tennyson, and illustrate your criticisms by not less than six passages quoted and commented upon.

8. (*Men only.*) Explain the following allusions:—'*A high speech of Seneca,*' '*An evil eye,*' '*The envious man that soweth tares,*' '*Saith Tacitus of Galba,*' '*primum mobile,*' '*The Legend, The Talmud, The Alcoran.*'

(*Women only.*) Analysis and Parsing from Routine.

9. Give some explanation of the changes which take place when invisible vapour becomes visible, and when visible vapour becomes rain. Where are there rainless regions?

10. (*Men only.*) Briefly describe Mexico under the heads of Surface, People, Productions.

(*Women only.*) Where and what are Elephanta, Mecca, Andaman, Lassa, Gilghit, Lena, Singapore, Irkutsk?

11. (*Men only.*) Describe two of these—Quebec, New York, New Orleans, The Cod Fishery.

(*Women only.*) Give very brief descriptions of Hong Kong, Bombay, Aden, and Singapore. When were they acquired by the British Crown? Of what use is each of them to the Empire?

12. Write a short account of the career of Robert Bruce, and state the grounds of his claims to the throne of Scotland.

13. Give some account of the state of affairs in Ireland in the years 1793, 1797.

14. (*Men only.*) Recite the chief declarations of the Bill of Rights as regards (*a*) The Dispensing Power, (*b*) Standing Armies, (*c*) Taxation, (*d*) Freedom of Parliament.

15. What will be the cost of the bricks for a wall 5 feet high, 22½ ins. thick, and 35 yards long, at 15s. per thousand, each brick being 9 ins. long, 4½ ins. wide, and 3 ins. thick?

Ans. £10 10s.

16. If the weights of the same bulks of mercury and glycerine be as 11 to 1, what will be the height of a glycerine barometer when the mercurial barometer stands at 29·45 ins.? Ans. 9 yards.

17. (*Men only.*) Find the radii of a circle inscribed in a triangle whose sides are 45, 50, 60 feet. Ans. 15 feet?

(*Women only.*) Draw a diagram of an infant's shirt, showing the various parts of the garment. Give directions for making it up.

18. (*Men only.*) A circular grass plot contains 1,760 square yards. It is surrounded by a gravel walk 10 feet broad. Find the area of the walk. Ans. $160\sqrt{35}$.

(*Women only.*) Explain the use of the G.C.M. of two numbers or quantities. Reduce the fraction $\frac{125237}{144667}$ to its simplest form.

Ans. $\frac{23}{28}$.

19. (*Men only.*) Simplify $\dfrac{x^{\frac{1}{3}}+3y^{\frac{1}{3}}}{x^{\frac{1}{3}}-3y^{\frac{1}{3}}}+\dfrac{x^{\frac{2}{3}}-3x^{\frac{1}{3}}y^{\frac{1}{3}}+9y^{\frac{2}{3}}}{x^{\frac{2}{3}}+3x^{\frac{1}{3}}y^{\frac{1}{3}}+9y^{\frac{2}{3}}}$.

Ans. $\dfrac{2x+36x^{\frac{1}{3}}y^{\frac{2}{3}}}{x-27y}$.

(*Women only.*) Name some dishes specially suited to invalids. How should they be prepared?

20. (*Men only.*) An officer can form the men in his battalion into a solid square, and also into a hollow square 12 feet deep. If the front in the latter formation exceed the front in the former by 3, find the number of men in the battalion. Ans. 1,296.

(*Women only.*) Compare beef, mutton, veal, pork, and fish as articles of food in respect of nourishment and economy.

21. (*Men only.*) Find the centre of a given circle.
Construct a circle of given radius which shall pass through two given points.

(*Women only.*) What part of her own laundry work might a schoolmistress reasonably be expected to undertake? How and when should she do it?

22. (*Men only.*) Write out Euclid III. 17. What shorter method is there?

Second Year.

Second Week.

1. As in First Year.

2. As in First Year.

3. Analyse the faculty of *Memory*, and say how, according to Locke, it should be trained.

4. Write out the notes of a lesson on *Gibraltar*, or (for infants) on *Bread*.

5. As in First Year.

6. As in First Year.

7. Enumerate twelve instances where Shakespere's use of Preposition differs from modern custom.

8. Analyse and Parse from Routine.

9. (*Men only*). As in First Year.

(*Women only.*) Map from Routine.

10. (*Men only.*) Name the principal mountain ranges of N. America, and the principal rivers that rise in their slopes. Show that the shortest route from England to New Zealand lies across N. America, and name the American ports of landing and embarkation.

(*Women only.*) Describe the surface of Australia.

11. (*Men only.*) As in First Year.

(*Women only.*) Describe the dangers that threatened England in the year 1588.

12. (*Men only.*) As in First Year.

(*Women only.*) Relate the History of Taxation under the Tudors.

13. (*Men only*). If $a + b$ vary as $a - b$, prove that $a^2 + b^2$ varies as ab.

If the time of describing any space vary as the square root of the space, and if the time of describing 144 feet be 3 seconds, what will be the time of describing 400 feet? Ans. 5 seconds.

(*Women only.*) Write short lives of Cranmer and Drake.

14. (*Men only.*) If the number of Permutations that can be formed with a certain number of things taken 3 together is equal to 20 times the number, how many things are there? Ans. 6.

(*Women only.*) Cut out in paper the left half of a woman's night-dress.

15. (*Men only.*) Find the area of the curved surface of the frustum of a right circular cone, the circumferences of whose ends are 15 and 17 inches, and the slant height 11 inches. Ans. 176 sq. in.

(*Women only.*) As in first Year.

16. (*Men only.*) Find the area of the surface of a sphere whose radius is 5 inches. Ans. 314·16 sq. in.

(*Women only.*) As in First Year.

17. (*Men only.*) Inscribe a square in a given circle.

To inscribe in a circle a rectangle equal to a given rectangle.

(*Women only.*) Make a list of the utensils required for cottage cookery, and state the probable cost of each. What sort of stove or range would be suitable, and why?

18. (*Men only.*) As in First Year.

(*Women only.*) Give a few general rules for the management of a sick room.

FOURTH WEEK.

1. As in First Year.

2. As in First Year.

3. How is the general principle, that we should '*in teaching proceed from the simple to the complex*,' explained and illustrated by (*a*) Locke, and (*b*) your own experience? *or* How would you teach literary composition?

4. Write out the notes of a lesson on '*The planetary system*,' or (for infants) on the '*The breakfast table*.'

5. As in First Year.

6. As in First Year.

7. Paraphrase from Routine.

8. Analyse from Routine.

9. (*Men only.*) As in First Year.

(*Women only.*) Compare the climates of the Australian continent with those of similar European latitudes.

10. (*Men only.*) As in First Year.

(*Women only.*) Give some account of Turkestan, and describe the races which inhabit it.

11. (*Men only.*) As in First Year.

(*Women only*). Give some account of the 'Pilgrimage of Grace.' What policy did England pursue, and with what Powers was she chiefly in accord, or at variance during the reign of Henry VIII.

12. (*Men only.*) As in First Year.

(*Women only.*) Give a short account of Irish affairs in Elizabeth's reign.

13. (*Men only.*) A boat club consists of 12 members. How many different crews of 8 can be formed, and from how many of these must an individual member be excluded? Ans. 495, 165.

(*Women only.*) Write short lives of Sir Thomas More and Cardinal Pole.

14. (*Men only.*) Show that the number of combinations of n things taken p together + the number of combinations of n things taken $p - 1$ together = the number of combinations of $n + 1$ things taken p together.

(*Women only.*) Give the measurements, with diagram, of a shirt for a boy 10 years old.

15. (*Men only.*) A vessel holding 31,416 cubic inches, and *without* a lid, is in the form of a right circular cylinder, whose altitude equals the radius of the base. Find in square inches the area of the internal surface. Ans. 4,375.

(*Women only.*) As in First Year.

16. (*Men only.*) The area of the whole surface of a right circular cone is 100 square feet. Find in cubic feet the volume, when the slant height is twice the radius of the base.

Ans. 62·688.

(*Women only.*) As in First Year.

17. (*Men only.*) If two of the sides of a triangle or those sides produced be cut proportionally, the straight line which joins the point of section shall be parallel to the remaining side of the triangles.

ABC and DBC are two triangles, AD being parallel to BC. Prove that the parts of any line parallel to BC which are intercepted by the triangles are equal.

(*Women only.*) Describe the different methods of cooking meat, and specify the advantages and disadvantages of each method.

18. (*Men only.*) As in First Year.

(*Women only.*) What immediate steps should be taken in case of croup, nose-bleeding, dog-bite, poisoning, scalds and burns, cuts and wounds, fainting, broken bone?

CORRESPONDENCE.

We shall be pleased to reply briefly through these columns to any SUBSCRIBER *seeking examinational information or advice, and* **Enclosing the Necessary Coupon.**

This privilege does not, of course, extend to furnishing the solutions and answers of problems. All such communications should be addressed to 'THE QUERY EDITOR.'

Replies demanding urgency will be promptly forwarded per post on the receipt of a stamped and addressed envelope, **Accompanied by the Requisite Coupon.**

A post will be saved by writing direct to DR. GEORGE BEACH, M.A., STANLEY MOUNT, MACCLESFIELD.

G.C.L. (Richmond).—You have copied the problem incorrectly. The answer is right.

TINY (Bolton).—*White* is factitive adjective qualifying *house*.

J.S.J. (Stockport).—Flux's 'Scholarship School Management,' and Cartwright's 'Mental and Moral Science.'

C.Z. (Durham).—You will score better with the English.

MYRA (Swansea).—Men should study the 'Antitheta.'

S.W. (Chorley).—(1) See answer to J.S.J. (2) Egan's Deductions, Part II.

CROW (Lancaster).—Try Curwen's School Musical Leaflets, ½d. each.

RURAL (——).—See next few numbers of '*Girl's Mistress*.'

W.I. (Darlaston).—If you have secured the 'Good' for two years, apply for the Certificate.

'DOUBT' (Sandford).—Only *one* failure will count.

J.R.R. (Cambridge).—Apply to Russell Square for N.U.T. Code, sending price.

S.H. (Chester).—Gregory's Physiography, Hughes and Co.

N.T. (Newbury).—We have not received any letter from you.

R.A.P. (Rugeley).—'The Princess,' Macmillan & Co.

CYMRU.—I do not advise the special course.

H.W. (Denbigh).—(1) External candidates are not examined in Teaching. (2) Sime's 'Geography of Europe,' 2s.

E.M. (Highmoor).—(1) The 'Latin Author' is not yet set; (2) You had best await a special edition for the French; same will be forthcoming; (3) Moffatt's 'King Lear'; (4) Hughes' 'Domestic Economy,' and Mrs. Beach's 'Domestic Economy,' Parts I., II., III.

ANSWERED PER ORDINARY LETTER.—E.T.C. (Willington); M.T.L. (Lozells); K.N. (Battersea); E.H.H. (Westbank); W.E. (Bermondsey); M.C. (Cape Colony); H.W.W. (Pall Mall); E.O.S. (Yaxley); N.C. (Ramsey); A.P. (Grimsby); E.J.K. (Yiewsley); N.N. (Congleton); F.S.C. (Hazel Grove); E.W. (Wednesbury); C.R.W. (Cheslyn Hay); F.L. (Burnley); S.W. (Chesterfield); A.W. (Nottingham); B.R.Y. (Sunderland); E.T. (Prideaux); E.P. (Kidderminster); J.M. (Radcliffe); E.T.R. (St. Just); J.H.A. (Bacup); H.W.C. (Ashbourne); B.U. (Alresford); J.E.R. (Newcastle); E.W. (Wantage); F.L. (Stockton); B.E. (Alton); EXCELSIOR (Otley); SYBIL (Woodlesford); M.H. (Beverley); J.C.D. (Easingwold); T.M.E. (Llawrycoed); W.H.R. (Long Eaton); W.L.C. (Middlesborough); C.M. (Covent Garden); N.M. (Milford); M.J.E. (Ashford); D.S. (Liverpool); H.W.B. (Alnwick); E.T. (Harrietville); G.W.G. (Launceston); J.E.R. (Newcastle); A.S. (Elsecar); M.J.E. (Ashford); H.L. (Lowood, Queensland); J.L. (Keswick); J.H.H. (Tadcaster); 'J.' (Birmingham); F.E. (Oxford); G.W.S.B. (Monmouth); W.K. (Chelsea); H.E.H. (Barnsley); C.F. (Ipswich); W.T.G.B. (Soresby); J.L. (Crewe); E.B. (Prestbury); T.P.S. (Akroydon); B.S. (Tring); C.H.B. (New Mill); W.P.B. (Basford); E.L. (Gosport); O.P. (Wotton); W.H. (Crewe); M.M.B. (Dovercourt); J.P. (Market Drayton); G.A.C. (Beccles); C.C. (Wribbenhall); G.P. (Barnsley); G.T.L. (Acton); E.T. (Winchester); A.P. (Leicester); EDITH (Tynemouth); A.L.M. (Topsham); J.W. (Penygraig); E.A. (Old Goole); S.F. (Doncaster); FROG (Bedford); A.C. (Bethnal Green); M.M.B. (Dovercourt); D.A. (Huddersfield); J.H.M. (Edgbaston); J.B. (Colwich); SUM (Etruria); S.S. (Bugsworth); W.W.K. (Kensington); D.M.D. (Blarmacfoldach); G.E.C. (West Bromwich); S.W. (Whitford); 'Dis' (Ramsey); A.U.N. (Dunstable); A.M. (Embden).

NEW COMPOSITION STORIES.—STANDARD V.

Suitable for 'Unseen Tests' in Reading also.

173.

NECESSITY FOR EXERCISE.—An Eastern king had grown fat from want of exercise, and was altogether out of health. A celebrated physician was therefore called in. After the interview, he produced a pair of heavy metal balls covered with paper, on which was a great deal of curious writing. 'These,' said he, 'O king, are magic signs, and will restore you to health. Walk round your garden three times a day, holding in each hand one of these charmed balls, swing your arms continually backward and forward while you walk, till your forehead is bathed in perspiration.' The king followed the advice, and rapidly regained his health. Need we say that moderate exercise was his medicine?

174.

A SERVANT DYING FOR HIS MASTER.—A gentleman was travelling with his servant, in a sledge, through one of the extensive forests of Poland, when they were suddenly attacked by a number of wolves, which leaped furiously at the carriage. The servant, who instantly perceived that either he or his master must fall a victim to their fury, exclaimed, 'Protect my wife and children!' and instantly rushing into the midst of them, perished in a moment, and by this generous act saved his master, who fled from the danger by driving forward with the greatest rapidity.

175.

THE FOOLISH MAN AND THE SHADOW.—A foolish fellow went to the parish priest and told him, with a very long face, that he had seen a ghost. 'When and where?' said the pastor. 'Last night,' replied the timid man, 'I was passing by the church, and up against the wall of it I beheld the spectre.' 'In what shape did it appear?' said the priest. 'It appeared to be the shape of a donkey.' 'Go home, and hold your tongue about it,' rejoined the pastor; 'you are a very timid man, and have been frightened by your own shadow.'

176.

THE CAMEL'S REVENGE.—A few years ago it chanced that a valuable camel, working an oil mill in Africa, was severely beaten by its driver, who, perceiving that the camel had treasured up the injury, and was only waiting a favourable opportunity for revenge, kept a strict watch upon the animal. Time passed away; the camel, perceiving that it was watched, was quiet and obedient, and the driver began to think that the beating was forgotten, when one night, after a lapse of several months, the man, happening to remain awake, observed by the bright moonlight that when all was quiet, the animal looked cautiously around, rose softly, and stealing toward a spot where was a bundle of clothes thrown carelessly on the ground, resembling a sleeping figure, cast itself with violence upon them, tearing them viciously with its teeth. Satisfied that its revenge was complete, the camel was returning to its corner, when the driver sat up and spoke; and at the sound of his voice, and perceiving the mistake it had made, the animal was so mortified at the failure and discovery of its scheme that it dashed its head against the wall and died on the spot.

177.

KINGS WERE SCARCE.—George the First, on a journey to Hanover, stopped at a village in Holland, and while the horses were getting ready, he asked for two or three eggs, which were brought him, and for which he was charged two hundred florins. 'How is this?' said his majesty, 'eggs must be very scarce in this place.' 'Pardon me,' said the host, 'eggs are plentiful enough, but kings are scarce.' The king smiled, and ordered the money to be paid.

178.

THE THIEF AND THE TURTLE.—A thief made his way into a house one night, and crept into the larder in search of something to eat. As he was groping about in the dark, his hand touched something which he knew by the feeling must be a basket. Cautiously he put his hand in, expecting to get hold of something good. Unfortunately, however, it got hold of him. It was a live turtle. He tried in vain to keep quiet and get away his fingers; the turtle held on so tightly that he was compelled to cry out with the pain. This awoke the people in the house; the landlord and some others came down and secured him, and in the morning he was handed over to the police.

179.

A ROYAL FUNERAL CUSTOM.—When a funeral takes place in Vienna of a member of the Royal family, red is used for the coffin and horses' harness if for a Princess—black for a Prince. The sign of deepest mourning is when the horse of the dead Prince follows covered with a black cloth and lame in one hoof. The lameness is artificially managed by driving a nail through the horse-shoe so as to hurt the horse, which in consequence limps. The horse follows directly after the coffin, and makes a sad impression.

180.

A CASE FOR DOUBT.—Lawyers, as a rule, have a bad name, and some people believe that they are never honest. In a certain town a lawyer died who was a very worthy and upright man, and accordingly upon his tombstone in the parish churchyard he was described as 'a lawyer and an honest man.' Some time afterwards, a party of farmers visited the place, and some of their number went to see the parish church. In passing through the churchyard, one of them noticed the inscription, and paused as though lost in thought. The others, seeing he had stopped, went back and asked if he had discovered anything. 'No,' said he, pointing to the inscription on the stone, 'but I was wondering why they came to bury these two fellows in the same grave.'

181.

A BIRD'S REVENGE.—A singular instance of vengeance on the part of a bird occurred some time ago in America. A bird had built her nest under the balcony of a country house, and for many years had occupied the spot unharmed. One spring, however, a robin arrived before the lawful owner, and not only took possession of the nest, but declined to retire from it. A quarrel of course ensued, but no notice was taken of the circumstance till autumn, when the peculiar shape of the nest attracted attention. It was found to be a double nest, one built above the other, and in the lower one lay the body of the dead robin. The bird had constructed a fresh nest, and completely entombed the unfortunate robin.

182.

THE POWER OF THE MICROSCOPE.—Some years ago it was discovered by the authorities of a railway in Germany, that a barrel despatched from a certain station had during its journey been emptied of its contents, and filled with sand. For some time no clue to the thief could be obtained; but at length a learned professor, having been consulted on the subject, called in the aid of the microscope. And this was how the thief was found out. The professor, knowing that there was a distinct difference in the sand found near the various stations, sent for samples from each of the places through which the train had passed. He then carefully examined each sample with his microscope, compared it with the sand found in the barrel, and thus found out the station from which the sand had been procured. Little difficulty then remained, for the railway servants employed at it were so few in number that the culprit was readily detected.

183.

QUITE PREPARED.—One hot day in summer a man entered a farmhouse in a small village in Staffordshire. Noticing a large number of flies about the place, he mentioned the matter to the proprietor, who said he wished he could get rid of them. The man thereupon offered to kill every fly in the place if the farmer would give him a quart of cider. This was agreed to, and the cider was placed before him. Having drunk all he wanted, the man handed the rest to some men who were close by. Seeing him standing idle, the proprietor asked him when he was going to start to kill the flies, whereupon the man coolly replied, 'Well, you catch them, then I'll kill them fast enough.'

184.

THE SPORTSMAN AND THE DUCKS.—One afternoon a gentleman, who had met with no luck whilst shooting during the previous part of the day, happened to pass a farmyard, at the gate of which a rustic was standing. Accosting him, the visitor remarked on the large number of splendid ducks in the pond. 'Yes, they are fine birds,' was the reply. 'They seem rather tempting for a gun,' remarked the sportsman. 'What would you allow me to take a shot at them for, just for a bit of sport? Would you take ten shillings?' 'Well, I don't know exactly; but there, give me the money, and fire away,' answered the countryman. No sooner had the golden coin changed hands than the gun was raised, and half-a-dozen fine ducks fell to rise no more, whilst a number of others flew in all directions, with their feathers more or less ruffled. The possessor of the half-sovereign, instead of appearing astonished at the disastrous result of the experiment, treated the matter with the utmost unconcern, which somewhat puzzled the stranger, who laughingly remarked, 'That's a fine shot, if you like!' 'Yes, it was; but what old Farmer Giles will say when he comes out, I don't know. They're not mine.'

NEW READING TESTS.—STANDARD III.

Suitable for 'Unseen Tests' in Dictation also.

149.—The silkworm is now common enough. Once it was only to be found in China, and there it was discovered that the beautiful golden thread, or cocoon in which the little creature wraps itself, could be woven into a beautiful material fit to be worn by emperors and queens.

150.—A nobleman told his footman one day at the railway station to take the tickets, which, accordingly he did, buying two first-class tickets, giving one to his master, and then getting into the same carriage with him. The nobleman said nothing; but on the next occasion he procured the tickets himself—a first and a third-class—and, giving up the 'first' to the servant, he travelled 'third' himself.

151.—Japan is a country of marvels, its sky is bright, its flowers beautiful, and its fruits delicious. Peaches grow well, but many of them, instead of being pink and white like ours, are black. When cut, the flesh is seen to be of a reddish brown, but the flavour is beautiful, and it seems likely that the black peach may be grown in many temperate climates.

152.—A gentleman had a black cat, which had round its neck a piece of ribbon with a small bell attached. Topsy was forbidden to go into the bedrooms. One day the gentleman was sitting in the drawing-room, when he heard a slight sound on the stairs, and went to see what it was, when he was both surprised and amused at seeing the cat actually creeping upstairs with the bell in its mouth!

153.—A teacher in a village school asked the children to name the fruit each one liked best. One liked peaches, another pears, a third grapes, and so on until a little fellow at the foot of the class was reached. Almost every kind of fruit known had been named two or three times, but Tommy, with a smack of his lips, indicated his choice by saying, 'Mashed potatoes, ma'am!'

154.—Tobacco, by its moisture and softness will indicate the approach of a storm, a loose window cord will tighten up just before rain, and a pair of gloves, usually tight on the hands, will become almost baggy on the approach of bad weather.

155.—When he arrived in the great city he was told that he would be able to get the best education, and would have the opportunity when he was old enough of filling a good position. His uncle, faithful to his promise, wished that his adopted child should have high honours. His wish was granted, for high honours were indeed given to the noble boy.—(H.M.I.'s Test.)

156. Little deeds of kindness,
Nothing do they cost;
Yet when they are wanting,
Life's best charm is lost.
Little deeds of kindness,
Richest gems on earth;
Tho' they seem but trifles,
Priceless is their worth.

NEW DICTATION TESTS.—STANDARD IV.

Suitable for 'Unseen Tests' in Reading also.

No. 92.

Do good, and leave behind you a monument of virtue that the storm of time can never destroy. Write your name in kindness, love and mercy, on the hearts of thousands you come in contact with year by year, and you will never be forgotten. No; your name, your deeds, will be as legible on the hearts you leave behind, as the stars on the brow of the evening. Good deeds will shine as brightly on the earth as the stars of heaven.

No. 93.

A gentleman on a walking tour stayed a night at a prim old lady's cottage, the inns being full. He was very deaf, and took care to impress the fact on his hostess, with instructions that some one must enter his room to awake him at a particular time in the morning. Waking of himself some time later, he found that the old lady had slipped under his door a note, inscribed, 'Sir, it is half-past seven.'

No. 94.

The world has always been divided into two classes—those who have saved and those who have spent—the thrifty and the extravagant. The building of all the houses, the mills, the bridges, and the ships, and the accomplishment of all other great works which have rendered man civilised and happy, have been done by the thrifty, and those who have wasted their resources have always been their slaves. It has been the law of nature and of providence that this should be so.

No. 95.

The king of the vultures is said to exact the utmost deference from his subjects. When hundreds of vultures have been attracted by the scent of carrion, they all immediately retire to a distance on the appearance of his majesty. When the monarch has satisfied his cravings with the choicest morsels, he leisurely departs, and then the common vultures swoop down to devour his leavings.

No. 96.

Many people suppose that rosewood takes its name from its colour, but this is a mistake. Rosewood is not red, nor yellow, but almost black. Its name comes from the fact that when first cut it exhales a perfume similar to that of a rose, and although the dried rosewood of commerce retains no trace of this early perfume, the name lingers as a relic of the early history of the wood.

No. 97.

The colour of the shark's egg is black, of leathery texture, thin, tough, and in form similar to a hand-barrow, the body of the barrow being represented by the middle of the egg, and the handles by the four projections at the angles. These projections, which are called tendrils, are of use to enable the egg to cling to the waving seaweed at the bottom of the ocean, thus preventing it from being washed away by the currents.

No. 98.

So far from light being an attraction to worms, it has been found that a strong light concentrated for a considerable time, say five or six minutes, upon the head of the worm, will cause it to gradually retreat into its burrow, proving that though blind in the ordinary sense, there still is sufficient sensibility in the nerves of the head to enable the animal slowly to distinguish the continuance of light.

No. 99.

Some idea of the intense cold now prevailing in America and Canada will be gathered from a circumstance which occurred recently at a fire in Montreal. The water from the hydrants froze as it fell, and even the walls of the burning building became coated with ice. The firemen had to pause every now and then to thaw themselves out from the mass of icicles in which they had become enveloped.—(H.M.I.'s Test.)

No. 100.

Live for thy God! thine anchor shall be cast
Where no false quicksands shift its hold away;
Through the clear future, from the sunrise past,
Glows the calm light along the even way.
The loss of human hopes shall vex no more
Than the quick withering of earth's common flowers:
For well thou know'st, when pain and death are o'er,
Eternal spring shall glad the heavenly bowers!

STANDARDS V.—VII.

No. 83.

The Sultan of Turkey has the largest private income of any monarch in the world. The Shah has a larger capital in the way of treasure, but a far smaller revenue. It is perhaps not generally known how good an administrator the Sultan is. He is in the habit of personally supervising all the smallest details of administration, from imperial negotiations with the Powers to the minutest police regulations of his capital. The popular notion that the Grand Turk does not share our views of morality is wholly incorrect. The Sultan keeps a large staff of spies, and if he hears of the misconduct of any public functionary, high or low, the man is instantly dismissed.

No. 84.

A recent traveller in India gives an account of the difficulty he experienced in detecting tigers in the jungle grass. They are chiefly found in the vicinity of rivers, hiding amongst the long, spiky grass which grows near the streams. On an English pasture the tiger would be a prominent object, but near the jungle rivers the body colour of the animal is so closely related to the colour of the dry river sand, while the brown spiky grass harmonises with the black stripes on the monster's hide, that sportsmen are puzzled when native beaters point out the object of their search.

No. 85.

Towards the reign of Elizabeth, coal was becoming a popular kind of fuel, chiefly owing to the difficulty of obtaining a cheap and plentiful supply of wood. A strong prejudice, however, lingered against it, and the Queen prohibited the burning of coal in London during the sitting of Parliament, for it was feared that 'the health of the knights of the shires might suffer during their abode in the metropolis.' In the days of Charles I. the use of coal became very general, and, as the demand increased, the price went up to such an extent as to preclude the poor from obtaining it. Not a few died from cold for want of fires.

No. 86.

General Gordon's courage was an instinct, fortified by faith in God and in a future life. This life had no intense pleasures for him, and he shrank from the applause of men. He did whatever came to his hand with all the loyalty of an English gentleman, and especially with the earnestness and zeal of a servant of Christ. The world was to him a sort of prison, beyond the precincts of which lay that New Jerusalem from which his waking thoughts, and very dreams even, never wandered. Whilst in this mundane prison, he tried to do God's bidding with that unbounded sympathy for the sufferings of all animal creation that was one of his most remarkable characteristics.

No. 87.

The Bluecoat Boys should be able to take care of themselves almost anywhere, for they are taught to do everything for themselves. They make their own beds, and make them well. In each dormitory there are fifty iron bedsteads. They black their own boots, with the exception of the monitors and first Grecians. Some younger boy is expected to perform the operation for them; but for this he must be paid, as fagging is not practised. To be admitted to the school a boy must not be younger than ten nor older than eleven years. According to the rules no child shall be admitted whose parents or relations do not need assistance towards his education and maintenance, though this rule is not rigidly enforced. Boys are admitted now by competition.

No. 88.

Vegetarians say it is a popular fallacy that meat is needed for strength. One prominent exponent of the faith says it is a fact that the strongest animals in the world are vegetarian and not carnivorous. It is the ferocity of the lion rather than his strength that makes him formidable. An elephant is a match for several lions, and is a vegetarian. The animals with most speed and endurance —the horse, the reindeer, the antelope, and others—are also vegetarians. Dog-trainers, says the authority, always feed their trick animals on a strictly vegetarian diet, and many hunters do the same thing.

No. 89.

The opposition which people show to ventilation is very remarkable. As a rule, in the very same proportion as their heated and close shops require it, so is their repugnance to it. They become like hothouse plants, sensitive to every reduction of temperature, and in constant dread of draughts. Notwithstanding, they are most reckless in exposing themselves outside their factories or shops. They emerge from the highly-heated debilitating atmosphere of the factory into the open air, often very cold, and in the midst of rain, without using the slightest precaution against chills.

No. 90.

The hand and the hammer are true loyal friends,
Between them no quarrels arise;
Oh! each on the other for ever depends
To gain labour's sweet golden prize.
The farmer, the blacksmith, and each working man,
While toiling for comfort and joy,
Remember the maxim, oh! work all you can,
No wealth without labour, my boy.
Then cheer for the wage worker and toiler,
He's the builder of home and joys;
All riches must come after hard labour,
There's no wealth without it, boys!

MODERN EDUCATIONAL REFORMERS.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

Author of 'Mental Science and Logic for Teachers.' Late Director of the Birkbeck Training Classes and Lecturer therein on School Method.

No. X.—DR. JOSHUA G. FITCH, M.A.

Late H.M. Inspector of Training Colleges for Schoolmistresses.

In the educational world, one of the chief events of the present year of grace has undoubtedly been the retirement of Dr. Fitch from the Inspectorate. For many years the policy of the Education Department has been more or less influenced by the counsels and recommendations of the late Inspector of Training Colleges, and, if his opportunities have been great, it must be conceded that his achievements have not been inconsiderable. This series would therefore be palpably incomplete should we omit to include therein Dr. J. G. Fitch.

Born just seventy years ago, in 1846 the future Inspector was a student at University College, whilst fulfilling the duties of occasional lecturer in the normal department of the British and Foreign Schools Society's Institute. The post of Vice-Principal of the Borough Road College becoming vacant in 1852, Mr. Fitch received the appointment and forthwith became the Principal's (Dr. Cornwell) able coadjutor. Four years later, when Dr. Cornwell passed over to the majority, the Vice-Principal was deemed worthy of promotion to the Principal's chair, which, however, kind Fate destined that he should occupy for only seven years. It is quite refreshing, in these days of haphazard (or worse) appointments to the Inspectorate, to note that Dr. Fitch was taken from Borough Road upon the recommendation of Lord Granville, who had himself seen and heard how well adapted was the young Principal to act as guide to the feet of the budding schoolmaster. What a pity it is that this admirable precedent has been so persistently ignored in after appointments, and how blind have successive Vice-Presidents of the Council been in failing to perceive that Dr. Fitch's unique success was due to the opportunity that he had of coming into direct contact with teachers at Borough Road. The new Inspector was sent to Yorkshire, where 'report spoke goldenly of his progress,' so much so that in 1877 H.M. Inspector for Yorkshire became Chief

Inspector for the Eastern Counties, receiving from the Yorkshire teachers, when leaving to enter upon this appointment, an assurance of 'their regard and appreciation of his uniform kindness and urbanity toward all with whom he came into contact, his impartiality and personal interest in teachers,' who, in return, were assured that 'an inspector should open his mind so as to recognise all forms of good and honest work.' Upon the death of Canon Warburton Dr. Fitch took up the Inspectorship of Training Colleges for Mistresses, which post he retained until the age clause compelled him to resign a most congenial position, to the loss of the Education Department and to the regret of the Training College officials whom it was his duty to supervise, and who, without exception, signed a petition for his further continuance in office, and, upon the refusal of this request, unanimously presented to the cashiered Inspector an address of appreciation couched in the most gratifying terms.

The many-sided culture of Dr. Fitch was not obtained at those ancient seats of learning which are fondly supposed to monopolise the power of bestowing this commodity upon their sons, for he is a Master of Arts of London University and an honorary LL.D. of Edinburgh. As he is admittedly one of the most successful Inspectors who have ever filled that sacred office, the case for the exclusion of teachers because they do not hail from Oxford or Cambridge will not hold water, whereas the telling effect of previous close acquaintance with the elementary school is demonstrated to a nicety in the career of Dr. Fitch. But it is hard to inspire the powers that be with faith in the capability of the mere teacher, let London University vouch as eloquently as she may for his culture, since even training college authorities reject their own men and women of proved scholarship in favour of graduated men from 'the older Universities,' who could most frequently emulate the spirit of President Lincoln, and retort upon their electors, 'A pretty mess you have got me into.'

Not only has Dr. Fitch won laurels as an Inspector; perhaps his greatest claim to notice rests upon the excellent service that he has performed in other directions.

From 1865 to 1867 he was Assistant Commissioner to the Schools Inquiry Commission, and his report on the West Riding of Yorkshire whilst acting in this capacity is a monument to his critical judgment and reforming instinct.

In 1869, at the instance of Mr. W. E. Forster, he became one of the two Special Commissioners whose business it was to report on the educational prospects of Manchester, Birmingham, Liverpool, and Leeds. The next year saw his appointment as Assistant Commissioner under the Endowed Schools Act, in which position his knowledge and judgment with regard to matters pedagogic must have been of rare service to the Charity Commissioners in dealing with the various grammar schools.

The year 1884 saw the over-pressure agitation brought to a head, mainly through the splendid efforts of Sir James Crichton-Browne. Aided, abetted, and applauded by the schoolmaster, encouraged by the appreciative attention of the general public, it is little wonder that the uncompromising attack of Dr. Crichton-Browne upon the citadel of payment by results spread consternation amongst the Departmentalists, who believed that the success of teachers in developing the minds of their pupils could adequately be gauged by a yard-measure. Dr. Fitch was the Claverhouse who was put forward by the perturbed devotees of red tape to stamp out this heresy. He undertook this 'unpleasant piece of official duty.' He launched his thunderbolts. He proved to the satisfaction of my Lords (if not to his own) that over-pressure was practically non-existent, and, if any achievement of the ex-Inspector and Commissioner is likely to damage his claim to the title of Educational Reformer, it is without doubt his action in this connection. The lamentable spectacle of a tried and proved reformer strenuously striving with might and main to impede the march of rationalism is one to make angels weep, and this, in the opinion both of teachers and of the man in the street, was the puzzling position taken up by Dr. Fitch. That his efforts were futile the progress of events in the educational world during the last decade is sufficient proof. Failure, indeed, was inevitable, for, let your logician be never so subtle and skilled, *magna est veritas et prevalebit.*

Turning from this 'unpleasant piece of official duty,' we hasten to add our meed of praise to the chorus of approval swelling up from both sides of the Atlantic with respect to the excellent service rendered by Dr. Fitch during his visit to the United States in 1888, when, as 'a chiel among them takin' notes,' he succeeded in making troops of friends, and when in the succeeding year he did 'prent them,' so welcome were the notes that they were rescued from the Blue Book in which they appeared, and under the title of 'Notes on the American Colleges and Schools' were scattered broadcast throughout the country, to the edification of all sorts and conditions of schoolmen, for, like Matthew Arnold, Dr. Fitch has the knack of breathing life into the dry bones of a Blue Book report. To this day the name of Dr. Fitch is amongst Americans in almost as much repute as was Quick in his day. He is the corresponding member for Great Britain for the *American Educational Review*, to which excellent periodical he has contributed the following interesting and instructive articles:—(1) Secondary Education in England (March, 1891); (2) Contemporary Educational Thought in Great Britain (April, 1891, and December, 1891); The proposed University for London (March, 1893); A View of England's Educational System (November, 1893). Furthermore, immediately upon the retirement of Dr. Fitch, Mr. Francis Storr, of the English *Journal of Education*, was constrained by the editor of the *American Educational Review* to publish a eulogistic sketch of the worthy Doctor, to which sketch we beg to acknowledge our indebtedness in preparing this article. Much more could be said in proof of the American conviction that Dr. Fitch is a burning and a shining educational light, a conviction which we most sincerely share with them.

Most of our readers are familiar with the fact that when in 1891 the freeing of the schools was about to become an accomplished fact, Dr. Fitch was sent on a visit of inquiry as to ways and means to America, France, and Belgium. In his report on this subject he warned over-sanguine people that the dawn of free education would not, of itself alone,

bring in its train that regularity and punctuality of attendance for which all well-wishers of education so ardently yearn.

This opinion was founded upon what he saw and heard in other countries, and our daily experiences unfortunately accord but too well with Mr. Fitch's somewhat pessimistic and dispiriting forecast.

The year 1879 saw the establishment of the Teachers' Training Syndicate in connection with Cambridge University. In furtherance of this excellent project yearly courses of lectures were to be given. The third course was delivered by the subject of our present sketch, and so instinct with wisdom were the lectures found to be that they were afterwards elaborated into 'Lectures on Teaching,' and published by the Cambridge University Press. Well for teachers was it that this step was taken, for the book is one of the wisest and most interesting works of its kind that has ever been given to the world. It is, as may be imagined, just as popular in the United States as in England, and it has been translated into most foreign languages, a distinction that it well deserves.

Pausing awhile to complete the sum of our Reformer's honours, we shall afterwards bring this article to a close by giving a few short extracts from the 'Lectures on Teaching,' in order to whet the appetites of those unfortunates who are as yet unfamiliar with this delightful and sagacious book.

On two occasions his *alma mater* has honoured him by making him examiner in English Language and History, viz., in 1860–65, and 1869–74. He was also made a Fellow of the University by the Crown, and is a member of the Senate. He is a Chevalier of the French Legion of Honour, a distinction conferred upon him in return for the attention that he had bestowed upon the French students who, with travelling bursaries, had come to study at English training colleges. Girton College and the Ladies' College, Cheltenham, acknowledge him as a Governor, as does also St. Paul's School. His zeal for the higher education of women was commemorated by the presentation to him of his portrait on behalf of the enthusiasts most interested in that excellent latter-day movement. He is also a Fellow of the Educational Institute of Scotland.

Whilst acknowledging the wisdom of the rule which deposes an inspector at the age of 65, or, in special cases, 70, Mr. Fitch confesses that it is an unnecessary one. He feels himself to be full of fight. Most fervently do we trust that he may long be spared to carry on this fight, for educational enthusiasts are not so plentiful as to make it possible to easily spare such a skilled and practised expert as Dr. Fitch has long since proved himself to be.

That a teacher should be trained, no matter what may be his natural endowment, Mr. Fitch rightly insists upon, pointing out that 'when in the department of painting you meet with a heaven-born genius, you teach him to draw,' in order that he may not mar the gifts that heaven has sent him. Furthermore, teaching is not to be learned by practice only, for (1) *natural aptitude*, (2) *the study of principles and methods*, and (3) *the lessons of experience*, are all indispensable if the teacher is to be perfected.

Equally certain is the eager student that the 'teacher should always be a learner.' 'The moment,' he says, 'any man ceases to be a systematic student, he ceases to be an effective teacher.' This may to some of us seem a hard doctrine, but in our opinion it is entirely true, especially when put upon the higher platform of conducing to the perfection of oneself not only as a teacher but better still as men and women, for 'the man is something greater than the teacher.'

Dr. Fitch also subscribes to the belief that a man should teach that which he knows and appreciates best. It is not the knowledge obtained that is most valuable, but the discipline acquired in the obtaining thereof, and this will be at its best when the subject taught is most congenial to the teacher.

'If when I see a school, and ask the teacher what is its special feature, or in what subject the scholars take most interest, he replies, "O, there is nothing distinctive about the course, we pay equal attention to all subjects," I know well that his heart is not in his work. *For over and above the necessary and useful subjects, every good school ought to reflect in some way the special tastes of the teacher.*'

The trite expression that teaching is the noblest of all professions, but the sorriest of all trades, is admitted by our author when he says that '*it is not labour, but vexation, that hurts a man.*' The truth of the following will be apparent to every teacher: '*teaching is one of the professions which most tries the patience; it is one in which the maintenance of a cheerful and happy temper is most essential.*' Dr. Arnold's tribute to personal activity in the teacher is quoted by Dr. Fitch with approbation: 'Whenever the day comes in which I feel I cannot run upstairs three at a time, I shall think it high time to retire.' The whole of the first chapter is an admirable exposition of the many and varied qualifications that are necessary to the success of a teacher. A perusal of this chapter would make many a parent pause before he committed his offspring to a profession in which the conditions of success are so many and so arduous. The chapter on discipline is very fine reading. The shouter has the well-known couplet thrown at his head, nor will one be inclined to pity him, for it is abundantly true that—

> 'He who in quest of silence, "Silence!" hoots,
> Is apt to make the hubbub he imputes.'

In support of Richter's '*pas trop gouverner*' Fitch says much. 'Your watch stops while you wind it up, and you everlastingly wind up children and never let them go.'

As to the faculty of command, natural endowment is a great factor. 'Some are born, like Hamlet's father, with

> "An eye like Mars, to threaten and command,"

or, better still, they are *naturally endowed with that sweet graciousness and attractiveness of manner which at once win confidence and predispose the hearers to listen and obey.* Of such a teacher her pupil may often say, as Richard Steele once said in the finest compliment ever paid to a woman, "*That to love her is a liberal education.*" To such, command is easy, to none is it impossible, by thinking well over his orders before he gives them, by giving them without faltering or equivocation, by obeying them himself, by determining in every case and at whatever cost to see them obeyed, and above all by taking care that they are reasonable and right.'

The little homily on habit and character is unique of its kind. 'In the long run it is far truer to say that *habits make character*, than to say that character makes habits. Character has not improperly been called a collection of habits. *We are what we are* not so much because of what we wish to be, nor of any sentiments we have formed, but *simply by virtue of what we are doing every day.*'

Whilst rejecting the cynicism of Sir George Lewis which is instinct in the words that '*life would be tolerable but for its pleasures*,' Dr. Fitch puts his finger on a real danger when he says that 'it is a poor thing, even in childhood, to be dependent for a substantial part of our happiness on treats and exceptional gratifications. In the long run we should find our chief delights in the ordinary pursuits and duties of life rather than in occasional relief from them.'

The chapter on punishment is replete with that rare kind of wisdom usually known as common sense. We should like to quote it in extenso, but must perforce content ourselves with saying that corporal punishment is recognised as a *dernier ressort*, the following suggestions being given as guides to its use:—

(1) Never inflict corporal chastisement for intellectual faults, for stupidity or ignorance. Reserve it exclusively for vices, for something morally degrading.

(2) Never inflict it while under the influence of heat or passion.

(3) Never permit an (immature) assistant or an elder scholar to inflict it under any circumstances.

(4) Do not let any instrument of punishment be included as part of the school furniture and as an object of familiar sight, or flourished about as a symbol of authority.

(5) Do not strike with the hand.

The word immature we have ventured to insert as expressing exactly what Dr. Fitch means. Much more might be added as to the unwisdom of mere memory training, the teaching of English, History, Science, etc., but we have already exceeded the limits of our space, and must conclude by recording our opinion that such is the merit of these epoch-making 'Lectures,' that to have written them is more than sufficient claim for inclusion in this our 'Reformers' Corner.'

CIRCULAR TO H.M. INSPECTORS.

PUPIL TEACHERS AND THE EXTENSION OF THEIR ENGAGEMENTS.

Education Department,
Whitehall, London, S.W.
15th May, 1894.

SIR,—1. Three Circulars, Numbers 295, 306, and 319, have recently been issued on the subject of extending the engagements of Pupil Teachers. The evil they have been intended to remedy is the occurrence, sometimes unavoidable, of an interval of time after the completion of the Pupil Teachership, and before the passing of the Queen's Scholarship Examination, which is a condition precedent of recognition under Article 50 of the Code. The remedies provided by the Circulars in question have been professedly temporary. It is thought that the time has now come for making a more permanent arrangement.

2. The Code provides that Candidates who fail twice to pass the Queen's Scholarship Examination may not be again examined (Article 48 (*d*)): but it does not prevent either the first or second trial from being indefinitely postponed. It provides also specifically (Article 41 (*f*)) for one postponement of the examination for a year and a corresponding extension of the engagement.

3. The Memoranda of Agreement issued in 1890, 1891, or subsequently, make slightly different provisions for extension of engagements on account of failure in any required examination or postponement of the Queen's Scholarship Examination. They all agree in allowing an extension for one year and one year only, in the event of failure in an Examination.

4. These provisions contemplate the reasonableness of one postponement of the Queen's Scholarship Examination. It is of course not possible to grant a repeated extension to a Pupil Teacher who repeatedly postpones the Queen's Scholarship Examination. But it appears not unreasonable to allow a Pupil Teacher, who defers the first trial for a year and attends the next two examinations, failing in the first, to be recognised as a Pupil Teacher up to the date at which he takes his second examination. Thus a Pupil Teacher may postpone his first trial from 1894 till 1895, and try in 1895 and again in 1896. It is reasonable to recognise him as a Pupil Teacher up to the announcement of the result of the 1896 Examination (Article 41 (*e*)). The same extension ought in fairness to be allowed to one who went in for his first trial at the earliest date and failed and then desired to defer his last trial for a year.

5. The case of a Pupil Teacher who fails in one of the earlier examinations and also in the Queen's Scholarship Examination without his recognition ceasing automatically under Article 41 (*b*) is peculiar. The Department reserve the power to treat each such case according to its merits; but, as a rule, Their Lordships will be disposed not to allow an extension previous to the Queen's Scholarship Examination to deprive a candidate of any of the privileges with regard to the Queen's Scholarship Examination granted by this Circular.

6. The marginal note to paragraph 4 of the Memorandum of Agreement prevents two extensions of the same engagement except where an extension under the first subdivision of paragraph 4 is followed by one under the second subdivision. In all other cases a new Memorandum of Agreement will have to be issued, as in the case of transfer to another School.

7. Re-admission in another School may in any case take the place of extension of an engagement, or of a new engagement in the same School.

I have the honour to be, Sir,
Your obedient Servant,
To———— G. W. KEKEWICH.
H.M. Inspector of Schools.

SPECIAL DRAWING CERTIFICATES WITHOUT EXAMINATION FOR THE OLD GUARD.

(FROM 'THE SCHOOLMASTER.')

SIR,—I beg to draw the attention of your readers to the following letter which has been received from the Department of Science and Art:—

'Department of Science and Art, London, S.W.,
'7th May, 1894.

'SIR,—I am directed by the Lords of the Committee of Council on Education to inform you that they have had under consideration your letter of the 12th March last, and that they are pleased to accede to the suggestion therein made by the Executive of the N.U.T., that this Department should adopt a course with regard to the elementary drawing certificate, similar to the course adopted by the Education Department, for a period after the passing of the Education Act of 1870, viz., the three years ended 31st December, 1873, and My Lords have accordingly determined that until the 31st December, 1896, a special certificate for drawing may be granted, without examination, to the older teachers referred to in your letter, who do not hold the Elementary Drawing Certificate, but have taught drawing in schools which have obtained at least two good reports ("good" or "excellent") during the five years ending 31st December, 1896.

'This special certificate will be granted to all such older teachers, on their applying for it, and provided that they satisfy the following condition:—

'(1) They must have been recognised by the Education Department as teachers of elementary schools for at least seven years pre-

WHEN WOODS ARE GREEN.

Moderato, mf. *Old Song, 'When Shaws are Sheen,' 1660.*

Key D. *Moderato, mf.*

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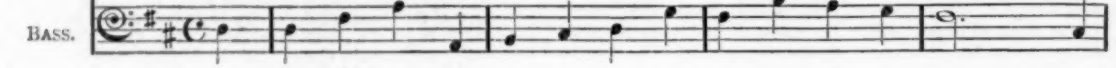

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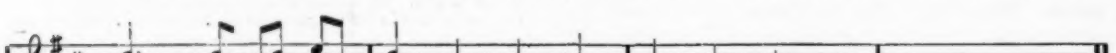

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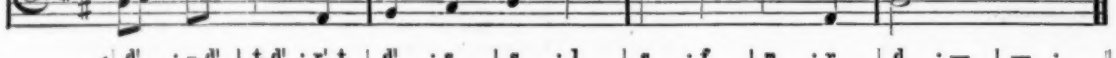

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	m	:d	s	:s_1	l_1	:t_1	d	:f	m	:f	s	:s_1	d	:—	—	:

2. Then let us ramble through the woods,
Where all is bright and gay,
And raise a carol loud and clear
To welcome beauteous May.

We 've wish'd and waited for her long,
And now she's with us here,
We'll give her welcome as the birds
Greet spring-time of the year.

vious to 1st September, 1891, when drawing was made a compulsory subject of instruction for all boys in schools for older scholars; and (2) they must present a certificate, if required by this Department, from the managers of the schools in which they have taught drawing, that the instruction in that subject was given by them regularly throughout the period in which the schools obtained the requisite reports.

'It is hardly necessary to point out that it would be impossible to issue the Elementary Drawing Certificate to such teachers, in its present form, as it is certified therein that the holder of it has passed the examinations of this Department in the prescribed subjects; and the special certificate to be granted instead of it will, therefore, be to the effect that its holder, having been an elementary school teacher of at least seven years' standing, previous to 1891, and having taught drawing in a school which obtained at least two good reports since August, 1891, is recognised by the Department of Science and Art as a teacher of drawing qualified to earn grants for that subject in elementary schools, on the same conditions as teachers holding the Elementary Drawing Certificate.—I am, Sir, your obedient servant, (Signed) J. W. D. DONNELLY.'

It is desirable that the Department's consent to the proposal made by the Executive, and that the terms of the consent should be widely known. I need not point out the importance of the arrangement thus made, nor the value of this further proof that it is the desire of My Lords of the Committee of Council on Education that every justice should be done to the teachers in the course of the general introduction of drawing in public elementary schools.

J. H. YOXALL, *Secretary*.

MODEL SOLUTIONS TO PHYSIOGRAPHY QUESTIONS.

ADVANCED PAPER.

SERIES I.

1. Why is Venus sometimes a morning and sometimes an evening star? State its position with regard to the earth and sun—

(*a*) At its stationary points;
(*b*) At superior and inferior conjunction.

Because Venus revolves round the sun in an orbit smaller than that of the earth. The distance of the earth from the sun is 93,000,000 miles, whereas Venus revolves round the sun at a mean distance of 67,000,000 miles. When the position of Venus with regard to the earth and sun is like that shown at the bottom of the accompanying figure, the earth's rotation brings the planet into view before the sun, and a 'morning' star is seen. When, however, Venus is situated as shown at the top of the figure, it is seen after the sun has set, and is, therefore, an 'evening' star.

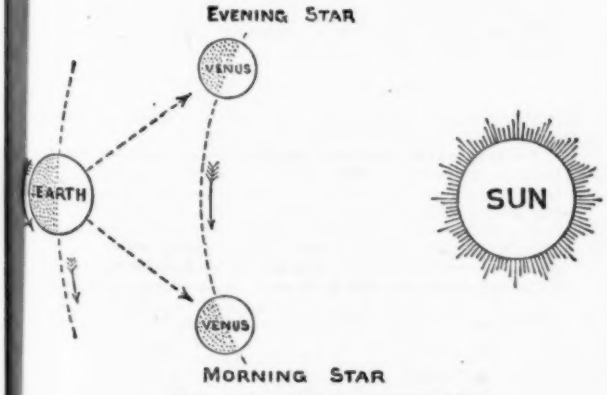

Fig. 1.—Venus as Morning and Evening 'Stars.'

(*a*) When Venus is moving directly towards or away from the earth, that is, when the tangent to its orbit passes through the earth, as shown in Fig. 2, from 'Advanced Physiography,' the planet is at its stationary points.

(*b*) At superior conjunction the sun is between Venus and the earth; at inferior conjunction Venus is between the sun and the earth (see Fig. 2).

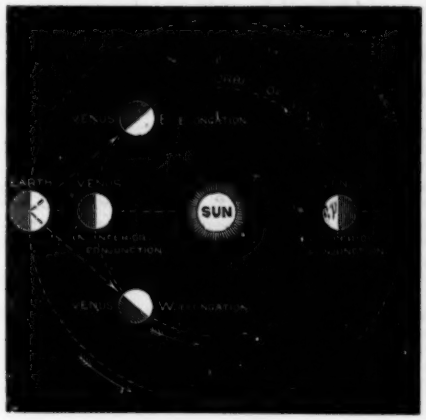

Fig. 2.—Aspects of Venus.

2. How would you test the adjustment of a transit instrument with regard to the meridian?

(Any of the following methods would gain marks. They are given in order of value.)

(*a*) By observing the transits of two stars widely separated in attitude, but which cross the meridian at about the same time.—The interval between the time at which the two stars ought to transit can be found from an almanac, and if the observed interval is equal to it, the instrument is in perfect adjustment. If, however, the lower of the two stars were found to transit too soon, the telescope points to the east of the meridian, while a westward bias is indicated when the star transits later than it should have done.

(*b*) By observations of the Pole Star, or other circumpolar star.—The Pole Star can be observed both at its upper and lower culmination at intervals of 12 sidereal hours. If a transit instrument is in proper adjustment, the interval from lower to upper culmination will be equal to that from the upper to the lower. If the error of the instrument be to the east or north, the interval from lower to upper culmination will be longer than the other; if to the west, it will be the shorter of the two. In this way the transit instrument can be adjusted without a knowledge of the right ascension of any star, or of the exact time. All that is required is a timekeeper going at a uniform rate.

(*c*) By observing the time of transit of the sun.—The time at which the sun transits at Greenwich is found from an almanac, and a watch is obtained that keeps Greenwich time. Now, if the observation were made on the meridian of Greenwich, the time indicated by the watch when the sun transited would be the time of transit at mean noon tabulated in the almanacs. At places east of Greenwich, however, the sun transits before this time, and at places west of it the time of transit is later, the difference depending upon the longitude of the place. Suppose the instrument to be set up in longitude 2° 30′ W., and the observer to be provided with a watch or chronometer indicating Greenwich time, and let the mean time of transit of the sun's centre given in the almanac for the day of observation be 11h. 56m. 8s. Adding the correction for longitude (2° 30′ = 10m.), the Greenwich mean time of transit at the place selected is found to be 11h. 56m. 8s. + 10m., that is, 12h. 6m. 8s. Exactly when the watch indicates 12h. 6m. 8s. the central cross-wire should lie across the centre of the sun's image. If it does not, a correction in azimuth must be made by means of the proper adjusting screws, and the observation repeated on another day.

A similar comparison can be made of the right ascension of a star (as given in a star catalogue) with the observed sidereal time of transit of the star. If the instrument be in the meridian, the sidereal time of transit has the same value as the right ascension of the star.

3. What is meant by the proper motion of a star, and by a star's motion in the line of sight? How can the latter be measured?

(*a*) The proper motion of a star is the motion across the celestial sphere due to the star's real movement through space.

On account of it, the right ascensions and declinations of stars are considerably changed after long intervals of time. A star's motion in the line of sight is its motion towards or away from the earth; in other words, its motion along a line connecting it with the earth.

(*b*) Observe or photograph the spectrum of a star side by side with the spectrum of a substance present in the star. Suppose the star's spectrum to contain the dark lines of hydrogen. If the object is at rest relatively to the earth, the lines of hydrogen in its spectrum coincide with those of the same element rendered luminous in the observatory. But a star moving away from the earth has all its spectrum-lines slightly shifted towards the red end of the spectrum of comparison, while a star approaching the earth has the wave-lengths of its spectrum-lines (equivalent to pitch in music) increased, that is to say, the lines are displaced towards the violet end of the spectrum. In the former case, therefore, the star's hydrogen lines would be observed or photographed on the redward side of their terrestrial fellows, and in the latter, on the blueward side.

4. State the methods which have been employed to determine the distance of the earth from the sun.

(As candidates were not asked to *explain* the various methods used in determining the sun's distance, but merely to *state* them, the following brief enumeration, from 'Advanced Physiography,' would doubtless gain full marks.)

(1) By the velocity of light.
(2) By the aberration of light.
(3) By a transit of Venus.
(4) By an opposition of Mars or one of the minor planets.

Series II.

5. (*a*) Draw and describe a form of maximum and minimum thermometer; and

(*b*) State the approximate reading of such an instrument when it is let down a bore hole 4,000 feet deep;

(*c*) When it is let down to the floor of an ocean at a depth of 3,000 feet;

(*d*) When it is carried up in a balloon to the height of 5 miles.

(*a*) *See Gregory's 'Elementary Physiography,' Figs.* 19 and 20, *for figures.*

The principle of the maximum thermometer depends upon the fact that the mass of the mercury in the thread of the instrument is insignificant in proportion to its length. The tube is bent, and at the bend a fragment of glass enamel is inserted. As the mass of mercury in the bulb expands, the metal squeezes past this partial plug, but so soon as cooling begins the mercury contracts. We may disregard the amount of contraction in the tube on account of the smallness of its calibre. The force that would draw the mercury in the horizontal limb bulkward is the force of cohesion, and this is overcome by the enamel plug, so that the end of the horizontal part of the thread (save for an infinitesimal contraction) remains at the extreme point of the scale to which it was pushed.

The minimum thermometer is usually an alcohol one with a horizontal limit, and an index of some light substance, having its end rounded, floats in the alcohol. As the liquid contracts the surface reaches this index, and the surface tension is strong enough to drag it back so long as the temperature falls.

(*b*) The surface temperature + about 80° F.

(*c*) Little, if anything over 32° F.

(*d*) There are no precise data, to judge by the Meudon experiments (Gregory & Wells 'Honours Physiography,' p. 82), the rate of diminution is about 1° C for 192–200 yards. This gives about 45° C below the surface temperature.

In (*b*) (*c*) (*d*) the examiners would probably accept any figures near the mark.

6. Describe the chief features of the following kinds of coral reefs:—

(*a*) Atolls,
(*b*) Fringing reefs,
(*c*) Encircling reefs,
(*d*) Barrier-reefs.

(Since there is a considerable choice of alternatives, we shall not confine ourselves here to naming one example as the examination candidate would have to do.)

(*a*) An atoll is a circular ring of coral reef with its surface, chiefly of coral dust and supporting only a sparse vegetation, but little above the sea level. On the outer face, on which the surf breaks, is a vigorous growth of coral dipping steeply down to a very great depth. Only the 120 feet nearest the surface of this submarine cliff is living coral. In this ring is nothing but a lake of still water, with more CO_2 dissolved in it than in ordinary sea water, a calcareous floor, and an abundant fauna of lime-loving organisms.

(*b*) A fringing reef lies close to a shore line. It follows the coast, but is broken opposite a river mouth or where there is any considerable tidal scour of sediment. Its features generally resemble the wall of an atoll, the only face being precipitous.

(*c*) An encircling reef is one ringing in an island, and according to the older theory (that of Darwin) destined to become an atoll.

(*d*) A barrier-reef differs from a fringing reef in being separated from the land by a broad channel of shallow water, which may be as much as forty or sixty miles wide. The landward channel has much the same bottom character as the central lake of an atoll.

7. Name the minerals which are present in:—

(*a*) Hornblende-granite,
(*b*) Common basalt,
(*c*) Crystalline limestone,
(*d*) Hornblende-schist.

(*a*) Hornblende, orthoclastic felspar and quartz.
(*b*) Plagroclase felspar, augite, magnetite (olionie).
(*c*) Calcite.
(*d*) Horneblende, some quartz, no well-developed felspar.

8. Give an example (and in each case describe briefly the causes to which the peculiar climatal features are due) of:—

(*a*) A district in which the rainfall is abnormally high,

(*b*) A district with no rainfall,

(*c*) A district in which the mean annual temperature is much higher than that of other places in the same latitude.

(*d*) A district in which the mean annual temperature is far below that of places in corresponding latitudes.

(*a*) The student should give some such typical district as The Terai, Assam, Burmah, Western Brazil, the Gold Coast, the York Peninsula, the West Indies, or Cumberland.

In the case of Assam, the causes are (1) the south-west monsoon (from May to October) brings with it the results of the enormous evaporation of the tropical Indian Ocean and Bay of Bengal. (2) The land rises very rapidly, cooling the wind by contact and by upward deflection. In all cases, indeed, the explanation resolves itself into (1) the prevailing wind is moisture laden, and (2) the land rises.

(*b*) The Sahara Gobi series of deserts, or the Central Australian desert, or the Desert of Atacama would be suitable examples. In the case of the latter the prevailing winds are the S.E. trades, which are robbed of all their moisture by the Andes.

(*c*) The British Isles, the west coast of Norway, Iceland, and Spitzbergen are examples, and less conspicuously so Vancouver's Island.

The direction of the Gulf Stream (in the last-named case the Kuro Givo) coupled with the high specific heat of water explains these cases.

(*d*) Cases are of two classes: (1) those due to elevation, *e.g.* Quito, Cashmere, the Pamir plateau, Davos, Denver, and so forth; of (2) those due to the remoteness of any water, and the consequent dryness of the air, and the excessive radiation at night and during the winter, *e.g.* some parts of Eastern Siberia and the Hudson's Bay Territory.

Honours Examination.

1. Give an account of the results so far obtained on the parallaxes of the fixed stars, stating also the methods employed.

The parallax of a star is the angle subtended at that star by the mean radius (93,000,000 miles) of the earth's orbit. Any line subtends an angle of one second of arc (1″) at a point situated at a distance equal to 206,265 times its length. The radius of the earth's orbit seen from a star at a distance of 206,265 × 93,000,000 miles would therefore subtend an angle of 1″. Since, however, so large a parallax has not yet been accurately found, no star is so near to us as 93,000,000 × 206,265 miles. About fifty stars have had their parallaxes well determined. The following are a few of the results obtained:—

Name of Star.	Parallax.	Distance in Light-Years.
α Centauri	0″.75	4
61 Cygni	0″.40	8
Vega	0″.16	20
Aldebaran	0″.12	27

(It was not, of course, necessary for candidates to give a table identical with the foregoing. Any evidence of knowledge of the kind of values obtained would sure to command marks.)

As to the methods employed, there are two, known respectively as the *differential* and the *absolute*. In the former, the star whose parallax is being determined has its position with respect to a number of faint stars near it measured throughout the year. If the star is nearer than the fainter ones used as points from which to measure, it appears to move with reference to them during the year, as will be understood from Fig. 3.

Fig. 3.—On account of the earth's orbital motion, each star describes a minute ellipse upon the celestial sphere in the course of a year.

If, however, the star under investigation is really more distant from the earth than the fainter ones, what is known as a *negative* parallax is obtained. These relative measures are made by means of an instrument called the 'heliometer,' or with the wire micrometer.

The *absolute* or transit circle method consists in accurately measuring a star's right ascension and declination at different times of the year. After eliminating various causes of error from the values obtained, the positions are found to arrange themselves in the form of a minute ellipse upon the celestial sphere. This ellipse is a miniature representation of the earth's orbit, and the angular dimensions of its semi-major axis is the parallax of the star observed.

Photography has been successfully employed in the determination of parallax. Photographs were taken from time to time of the selected star and the region near it. Measures of the relative positions of the stars on the pictures thus obtained furnished the data from which the parallax of the selected star was calculated. The only difference between this and the micrometer method is that the measurements are made from the photographs instead of being determined by eye observations in the telescope.

2. State what is known of the existence of carbon in various classes of celestial bodies.

The spectrum of nearly every comet consists of three bright bands identical as regards position and character with bands seen in the spectrum of the blue part of an ordinary candle flame. These bands are due to carbon, and they constitute the characteristic spectrum of a comet. There is also evidence of the existence of carbon in new stars, the best example being the new star which appeared in the nebula of Andromeda in 1885, and exhibited a spectrum of the same kind as that given by any ordinary hydro-carbon flame. Coming to nebula, we find that the nebula of Andromeda shows a spectrum in which the light of carbon can be distinguished, and carbon has also been detected in some planetary nebulæ. Professor Lockyer has shown that the record of the presence of bright carbon bands is unbroken from planetary nebulæ through stars with bright-line spectra, such as the bright-line stars in Cygnus, and γ Cassiopeiæ, to stars like Mira Ceti, α Herculis, and α Orionis; that is, entirely through Groups I. and II. of his classification. In all probability comets are swarms of meteorites, and we have said that carbon is one of the chief characteristics of their spectra. Professor Lockyer uses this as a foundation for the argument that since carbon is similarly manifest in certain nebulæ and stars, these bodies, like comets, are also uncondensed swarms of meteorites.

Indications of the absorption of carbon have been detected in the spectrum of the sun—a body belonging to Group V. of Lockyer's classification. According to the meteoritic theory, this absorption will go on increasing in intensity slowly, owing to reduction of temperature, until a stage is reached when the chief absorption will be that of carbon instead of iron, which is the most prominent element in the solar spectrum at present. Professor Lockyer has shown that the distinct characteristics of the spectra of some stars—viz. those belonging to his Group VI.—are dark bands of carbon, due to absorption in the stars' atmospheres. In connection with the subject of carbon in the sun, it is worth remark, that nearly thirty years ago Dr. Johnstone Stoney pointed out that the photospheric clouds are, in all probability, composed of incandescent carbon.

3. What is the nature of the small, constant movements (earth tremors) which take place in the earth's crust, and how have they been detected?

Attention has been directed in recent years to a periodic tide-like movement of the earth's surface, and a variety of other movements which appear to be continually happening. It has been found that there is a very slight tilting of the crust of the earth every twenty-four hours, which rises to a maximum during the night, and sinks to the level in the day. The cause of this regular change of curvature has not been determined; all that is known is that it is too great an effect to be the result of lunar attraction. It is possibly due to a concertina-like opening and shutting of the crumpled strata forming a range of mountains, brought about by the influences of the sun's heat. Since most of the earthquakes which occur in the Himalayas and Alps, and even those in volcanic Japan, are produced by faulting or sudden breakages in crumbling strata, rather than by volcanic explosion, the study of the periodic changes of level referred to may throw light upon the more striking phenomena of earthquakes.

Another class of movements, known as '*tremor storms*,' appear to be long, flat waves moving across the earth's surface, like an ocean swell. Such movements are sometimes produced by sharp variations in atmospheric pressure, and at other times result from violent upheavals occurring at a distance, as groundswells of the ocean, felt on our coasts, are caused by tropical storms. Wave-like movements radiate from the centre of disturbance outwards in increasing circles, becoming flatter and gentler in their advance until they are imperceptible to the senses, and are detected only by the most sensitive seismological instruments.

Instruments used to record earth tremors are known as tronometers. In one instrument of this kind a long pointer is connected with an induction coil every five minutes by means of clockwork. Electric sparks are thus caused to be discharged from the end of the pointer to a band of paper slowly moving in front of it. If the pointer is at rest, then a series of holes are made, following each other in a straight line; but if it is moving, the band of paper is perforated in all directions round what would be the normal line of perforations.

Another method of recording earth tremors is by a continuous photograph of a ray of light reflected from a small mirror attached to a small and extremely light horizontal pendulum.

4.—Give as full and complete account as you can of the composition of sea-water; stating the proportion of the most abundant salts, and the nature of the substances that exist in only very minute quantities.

With the exception of the calcium and sodium components, the relative quantities of the chief elements in solution is very constant. The salinity varies with the conditions of evaporation, the average being 3·4 per cent., while a maximum of 3·7 is reached in the North Atlantic about 23° North, and a minimum of 3·3 per cent. at a point south of 66° South in the Indian Ocean.

The following proportion of dissolved salt was given by Prof. Dittmar in the 'Challenger' Report:—

$NaCl$	77·758
$MgCl_2$	10·878
$MgSO_4$	4·737
$CaSO_4$	3·600
K_2SO_4	2·465
$MgBr_2$	0·217
$CaCO_2$	0·345
	100·

The amount of lime present varies between the limits of 1·585 to 1·825 per cent., but no relation to depth or superficial distribution has been determined. The elements named above do not, however, actually exist in these particular combinations, for all solution appears to be accompanied by disassociation. 'In seawater, as in any mixed solution, each base is combined with each acid, and as there are four bases and four acids there must be sixteen salts, the individual percentages of which we have no means of determining' (Dittmar).

As an instance of this, the magnesium may be in form of a double chloride with the sodium, and some perhaps may be combined with the carbonic acid. The carbonates present in it make seawater slightly alkaline.

Among the gases dissolved in sea-water, the oxygen and nitrogen are derived from the atmosphere, and their proportions, in the case of standing water, therefore, greatly depend

in each sample analysed upon the local conditions of atmospheric temperature and pressure. In the case of a current there are complicated influences causing great variation, arising from the present and previous conditions of the current. The proportions of gases also vary with the depth, and, generalizing, we may say that their amount diminishes downwards. Carbon dioxide, however, is exceptional, and is found in greatest quantity near the bottom of the ocean. From the difficulty experienced in obtaining it from sea-water samples, it would appear to be in a state of chemical or quasi-chemical combination. Dittmar suggests its presence in the form of a bi-carbonate.

It is a natural supposition to assume that all elements present in the earth's crust will be found in more or less quantity dissolved in sea-water. As a matter of experiment, however, besides those specified above, the following only have as yet been discovered:—

Iodine, abundantly present in seaweed, but only found in sea water in very minute quantity; *Fluorine*; *Phosphorus*, present as phosphates; *Nitrogen* occurs in combination in ammonia and organic matter, as well as in the free state already described; *Silicon*, as soluble silicates: *Boron*, present in some seaweeds, and also found in the water; *Iron*, *Aluminium*, *Barium*, and *Strontium*, in sufficient quantity to be chemically determined; *Silver*, *Copper*, *Lead*, *Zinc*, *Cobalt*, and *Nickel*. The presence of these in minute quantity in sea-water is inferred from their being found in certain corals and seaweeds; *Arsenic*, *Caesium*, *Rubidium*, and *Gold*; *Lithium*, identified by its spectrum.

45. Give an account of the results which have been obtained by recent researches in connection with *one* of the following subjects:—

(*a*) The causes of the variation of latitude.

(*b*) The part played by vegetable organisms in the formation of calcareous rocks.

(*a*) Variation of latitude has been considered under two main headings:—(i) A secular variation due to a gradual and permanent alteration in the axis of rotation extending over a vast period of time; and (ii) a periodic variation of small amplitude. Attention was called to the former by Lubbock, and it was discussed by Lord Kelvin and Professor Darwin, but no very recent contributions have been made to this branch of the question. It is under the second section that recent investigations have been prosecuted.

The facts of the case as summarised by Professor Chandler show a steady revolution of the axis of rotation round a fixed axis, which we may call the mean axis of the earth, in a cycle of between 348 (1774) and 443 (1890) days. Professor Chandler found these varying cycles resulted from the composition of an annual cycle of lesser amplitude with one having a period of 427 days (Chandlerian cycle).

The first of these cycles, the annual one, is accounted for by considering the displacement of the axis of inertia, due to the shifting of masses of snow, ice, and water, with the seasonal changes. No other cause has been suggested.

The second cycle is more difficult to explain. Euler long ago calculated the results of a body such as the earth, but supposed to be *absolutely rigid*, being set rotating about an axis which was not an axis of inertia. He found the axis of rotation in the case of a rigid earth under terrestrial conditions would wobble in a cycle of about 305 days. Newcombe has considered that a slight plasticity in the earth's mass would affect this period. The centrifugal force of the rotation would continually tend to make the axis of rotation the axis of figure, and the latter would move therefore in pursuit of the former. But ultimately the two axes should come to coincide unless other forces come into play to disturb this process.

Two other causes, modifying Euler's cycle, have been mentioned; one is the mobility of the ocean, and the other the possibility of internal forces altering the figure of the earth. More definite attempts at tracing the causes of these variations can only be made after prolonged investigation of a special and more accurate type.

(*b*) The share of calcareous vegetable organisms in the formations of limestones is not very considerable. Certain algæ, the calcareous algæ, strengthen their cell walls by means of $CaCO_3$, and they may accumulate to form the basis of a limestone, as for instance the Nullipore limestone. Bonney, in a recent discussion, pointed out that calcareous algæ are an important part of the pisolitic limestone of the Eastern Alps.

The Rhabdoliths and Coccoliths of the Atlantic Ooze are also formed by algal organisms, and probably therefore algæ have played a subordinate part in the chalk accumulation.

In addition, however, to the contribution of calcareous algæ to accumulations of calcium carbonate, water plants which do not directly *secrete* this substance may contribute to its precipitation by withdrawing an excess of CO_2 from water in which it is dissolved. It is a matter of common observation that submerged plants in lime-laden springs may become covered with a calcareous encrustation.

Recently attention has been especially directed to this matter in the discussion of a peculiar microscopic structure found in quantity in various Palæozoic limestones and known as *Girvanella*. *Girvanella* consists of clusters of sausage-shaped bodies or coiling tubuli of lime carbonate, and it was at one time regarded as a foraminferal organism. But Rothpletz regards it as an alga, and Clement Reid has suggested that these coils are the result of an encrustation round filamentous algæ. The matter is still under discussion.

LONDON MATRICULATION.

PREPARATION CLASS FOR JANUARY, 1895.

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LATIN.

Latin Course for July.

1. Vergil Aeneid V., lines 1–150. The most suitable edition for Matriculation is Calvert's (Macmillan, 1s. 6d.), which possesses notes and a vocabulary. Sidgwick's (Pitt Press), and Papillon and Haigh (Clarendon Press) are also very good, but they are not supplied with a vocabulary.

2. Grammar: Postgate's Latin Primer (Cassell), §§ 96–104; §§ 163–191; §§ 287–289; §§ 348–357; §§ 382–385; § 454; or Allen's Latin Grammar (Clarendon Press), §§ 81–85; §§ 132, 133; §§ 149, 150; §§ 196, 198; §§ 269–272; § 378. Revise also formation of adverbs, and the methods of comparison of adjectives and adverbs.

3. Translation at sight: a couple of pieces a week.

4. Bayfield: Exercises 5–24, 15–17 in each; Exercises 24–80, the 9th in each.

The following sentences should be done by students. They will be solved in next month's issue:—

(1) Whether he has done this or not is of great importance to you and Caesar.

(2) It is characteristic of a wise man not to give way to anger.

(3) News was brought to the general that all of us had been prevented from storming the town.

(4) You do not deserve to have this book taken away from you.

(5) The gallant Strabo threatened to put to death every tenth man if the ringleaders of the sedition were not handed over to him.

(6) It is not everyone who knows whether to praise or blame such men as these.

(7) It is said that his uncle had resolved to march as quickly as possible to Rome, a city which was four miles distant.

(8) I fear he lent his friend fifty sesterces.

Notes on Latin Course.

(The notes on Vergil V., 1–150 will be given next month.)

Latin Grammar Notes.

The verbs of the first and second conjugations that are irregular in the perfect and supine are most important, as this class of irregular verbs nearly always furnishes a question in the Matriculation. Students will have to refer back to them constantly. Remember that once you have the perf. indic. and supine of these verbs, the other parts are regularly formed from them.

The semi-deponent verbs (e.g. *gaudeo*) should be known.

Candidates are sometimes required to give a list of semi-deponent verbs.

In Postgate, § 349, note that *et* is the usual connective; *-que* couples closely, and *atque* is used when the second member is more important than the first. Also in § 351, *ibid.*, note that *aut* is used when there is a strong contrast; *vel* is used when the difference is not important. The uses of *quin* = 'nay,' in *quin etiam*, 'nay, even,' in questions = *why not*, should be distinguished from those of *quin* = 'that' after negative verbs of *doubting*, as *non dubito quin hoc fecerit*, 'I have no doubt that he did this.' Note that verbs intransitive in the active must be used impersonally in the passive; *e.g.*, *milites parcuntur*, 'the soldiers are spared,' is bad Latin, as *parco* governs the dative, and should be *militibus parcitur*. Note the verbs whose passive is supplied by a different verb, *e.g.*, *vendo* by *veneo; perdo* by *pereo; facio* by *fio; addo* by *accedo*. Impersonal uses of the passive, like *pugnatum*, 'a battle was fought,' are very common in Latin.

Students should note the rules for the insertion and omission of pronouns, which are so different from the English rules. Note that in sentences like 'I do not know the man I saw,' the relative, which is object to 'I saw,' cannot be omitted in Latin.

Learn the construction of impersonal and *quasi*-impersonal verbs, *e.g.*, like *taedet, libet, licet*. Make a list of these verbs in a note-book. Note that the primary tenses are the present, the present perfect, the future, and future perfect, while the other tenses are secondary. This classification is important, because on it depends the rule of the sequence of tenses of the subjunctive, numerous examples of which will be found in the sentences. Note the *historical present*. The uses of the subjunctive in principal or independent sentences are important. They were asked this month at the Matriculation. Briefly put, they are as follows :—

(*a*) *Jussive*, or *hortative*, in commands or prohibitions, negative is *ne*, as *ne hoc faciat*, 'let him not do this'; *hoc faciamus* = 'let us do this.'

(*b*) *Potential*, implying condition, as *si hoc dicat mentiatur*, 'if he were to say this, he would tell a lie.'

(*c*) *Dubitative*, or *deliberative* (called by Kennedy the Subjunctive of the Modified Question), as *quid faciam?* 'what am I to do?' *quid facerem?* 'what was I to do?'

(*d*) *Optative*, *felix sit*, 'may he be fortunate.'

N.B.—When the wish is future, the pres. subj. is used with or without *utinam;* when the wish is past, *utinam* must be used with the imperfect or pluperf. subj. Negative is *ne*.

The methods of expressing a prohibition are important. Remember that you must never use *ne* with the imperative in prose. Employ either *noli* (*nolite*) with the pres. inf., *cave* (*cavete*) with subjunctive, or *ne* with the perfect subjunctive.

French Course for July.

(1) Five pages of translation a week, with a certain amount of written translation.

(2) Grammar: Fasnacht, §§ 57–69.

Notes on French Course for June.

Learn the four classes of verbs. Note that the principal parts are the infinitive, the present participle, present indicative, preterite, and past participle. From these parts all the other parts of the verb are, as a rule, derived. The two first conjugations are called 'living,' the other two 'dead.' Learn carefully the ways in which the different tenses and moods are formed from the primitive parts.

Note that the pres. imperative 2nd sing. is the same as the second person singular of the pres. indic., except in verbs of the 1st conjugation which have no *-s*, and a few other verbs, like *couvrir, offrir, souffrir, cueillir, assaillir*. The conjugation of *être* and *avoir* is important. Certain neuter verbs in French, *e.g.*, *mourir, tomber, partir, sortir, venir, arriver, aller*, etc., are conjugated with *être* instead of *avoir*. The rules for the agreement of the past participle are most important:—(*a*) The past participle used as an adjective agrees. (*b*) The past participle conjugated with *avoir* agrees with the direct object if the direct object precedes, as *les livres que j'ai lus*, 'the books I have read.' (*c*) The past participle conjugated with *être* agrees with the subject (1) if *être* is used with the neuter verbs given above, '*la reine est morte*'; (2) if *être* is used to form the passive, '*la reine a été tuée*.' The past participle conjugated with *être* agrees with the direct object if it precedes, when *être* is used for *avoir* in the case of reflexive verbs, as *elle s'est tuée*. Care must be taken to distinguish between direct reflexive verbs in which the reflexive pronoun is the direct object, and reflexive verbs in which the reflexive pronoun is the indirect object. Questions are very often set on the agreement of the past participle, *e.g.*, one year an explanation was required of the agreement or non-agreement in the following sentences :—

(*a*) *Ils se sont vus et se sont parlé.* In the first case *vus* agrees because *se* is the direct reflexive pronoun ('they have seen each other'); in the second case *se* is indirect, and therefore *parlé* does not change.

(*b*) *Ils se sont donnés à l'ivresse.* Here *se* is the direct object ('they have given themselves up to . . .'), but in (*c*) *Il se sont donné la main, la main* is the direct object and does not precede, hence there is no agreement.

In June, 1891, the following question was set: 'Write down the following sentences, changing the infinitives into past participles: (*a*) Et s'ils avaient *suivre* mes conseils et mes voeux; (*b*) à ce discours, ces héros *irriter*, l'un sur l'autre à la fois se sont *précipiter*. (*c*) Voyez cette multitude d'yeux dont la nature s'est *plaire* à ceindre la tête de la mouche. (*d*) Quelles dures vérités ils se sont *dire*. In (*a*) we shall write *suivi*, which does not agree because it is a past participle conjugated with *avoir*, the direct object of which (*conseils*) follows. In (*b*) *irriter* will become *irrités* because the participle is here used merely as an adjective; *précipiter* will become *précipités* because it is a reflexive verb; and *se* is the direct object preceding the participle. In (*c*) *plaire* will become *plu*, which does not change because *se plaire* is not a *direct reflexive verb*. The French say *plaire à*. In (*d*) *dire* will become *dites*, to agree with the direct object *vérités*, which precedes. *Se* is only the indirect object. Note, however, that the French would say, 'Ils se sont *dit* ces dures vérités.'

Note that the present participle when used as an adjective agrees; when used verbally it does not agree.

Greek Course for July.

1. Iliad, 422–502.

2. In grammar, revise the declension of nouns. Learn the formation of the tenses in the active, middle, and passive.

3. Two pieces of translation at sight a week, and some exercises in Underhill's Exercises (Macmillan).

Notes on Greek Course for June.

1. Iliad, 338–421. Attention should be paid to all the syntactical difficulties mentioned in the notes, as a certain number of the questions bear on syntax. Students should also learn the declension of the nouns and adjectives occurring in the book, the comparison of the adjectives that are met with, and the principal parts of the verbs.

The following verbal forms should be parsed:—εἵλετο, ἐοικώς, πίοιεν, ἤλυθε, ἐφρασσατο, χύτο, ἔδδεισας, ἔασιν, ἀπαμύνασθαι, χαλεπήνῃ ἀπαλεξήσαιμι, ἀντιβολῆσαι, ὄλωλε, ἔνισπες, ὄπωπα, κεχολωμένος, ἤγαγε, λάχον, ταμών, προβθηκεν, νένικται, ἐτύπη.

In contracted verbs in αω the following are the Attic contractions:—αω=ω, αο=ω, αου=ω, αε=α, αει=ᾳ, αη=α, αῃ=ᾳ, αοι=ῳ. In verbs in -εω the contractions are εω=ω, εο=ου, εου=ου, εε=ει, εει=ει, εη=η, εῃ=ῃ, εοι=οι. In verbs in -οω the contractions are οω=ω, οο=ου, οου=ου, οε=ου, οει=οι, οη=ω, οῃ=οι, οοι=οι. Note that the infinitive of τιμαω is τιμᾶν, not τιμᾷν, and of δουλόω is δουλοῦν, no δουλοῖν. This exception to the above rules of contraction has been explained by saying that the contraction arises from the Doric infinitive in εν. Note that the verbs χράω, διψάω, πεινάω, κνάω, σμάω, and ζάω contract into η where other verbs in -αω contract into α. Dissyllabic verbs in -εω only contract εε and εει; *e.g.*, πλέω in the present indicative is conjugated as follows :—πλέω, πλεῖς, πλεῖ, πλεῖτον, πλεῖτον, πλεόμεν, πλεῖτε, πλέουσι. δέω (to bind) is an exception to this rule.

English Course for July.

1. Hewitt & Beach, pp. 196–259, 351–386; or Morris's 'Outlines of English Accidence, chs. xiv.–xvii., with Beach's 'Elements,' 80–97 (in last month, pp. 60–63 should have been 60–80), pp. 119–124.

2. History, from the end of the reign of Richard II. to the end of the reign of Edward IV.

Revise from the reign of Alfred to the death of Harold at Senlac.

(Notes on June and July Course will be given next month.)

LATIN TEST PAPER.

(1) Give the gender and genitive singular and plural (when found) of *senex celer, anas, pālus, pălus, nemo, eques, classis, ater turbo, pernix avis, istud fulgur.*

(2) Write down the positives, comparatives, and superlatives of the adverbs connected with *malus beneficus, facilis, nequam, acer, citus.* (Matr., June 1891.)

(3) Distinguish the uses of *aequus, aequalis; arma, armus; copia, copiae; mālus, mălus; oblītus, oblĭtus; parum, parvum.* (Matr., June 1891.)

(4) Name three verbs which have a perfect form but a present meaning. What meaning has the pluperfect of such verbs? (Matr., Jan. 1894.)

(5) Construct short sentences to show what you understand by (*a*) the *accusative of respect;* (*b*) the *dativus commodi;* (*c*) the *ablative of quality;* (*d*) the *accusative of exclamation.* (Matr., Jan. 1894.)

(6) Distinguish the uses of *quisquam, quisque,* and *quisquis.*

(7) When is *anyone* translated by *quis?*

(8) Translate the following sentences into Latin, paying special attention to the words in italics :—

(*a*) Can *anyone* believe this man? (Answer '*no*' expected.)
(*b*) He did this lest *anyone* should go out.
(*c*) He said that *no one* could do this.
(*d*) I am afraid that *no one* can escape.
(*e*) A *certain* man came to meet me.
(*f*) *Some* say this is true, others deny it.
(*g*) One Consul was killed, the *other* escaped.
(*h*) It is not *everyone* who can do this.
(*i*) Will *anyone* go and see him?
(*j*) *Some one* perhaps will say this.

ENGLISH TEST PAPER.

(1) What phases of English are illustrated by the plurals : *men, shoes, these presents, sheep, mathematics?* (Matr., Jan. 1894.)

(2) Give instances of the conversion of abstract into concrete, proper into common, common into proper nouns, and try to explain why each of these conversions should occur. (Jan. 1894.)

(3) Describe the principal sources of apparent irregularity in the conjugation of strong verbs in modern English.

Comment on the forms—'I have struck,' 'The sun has shone,' 'I shot.' (Jan. 1894.)

(4) Give a short history of the second personal pronoun in English (singular and plural), with regard to changes both in form and usage. (Jan. 1894.)

(5) Write down all the inflexions still extant in English grammar. Why are there now so few? Can you mention some that are lost? (June 1893.)

(6) Give examples of defective verbs. Write down the 2nd person singular pret. of *am.* What other form is found? (June 1893.)

(7) Parse *please* in 'please *write clearly*'; *thank* in 'thank you'; *like* in 'if you like'; *bad* in 'from bad to worse'; *having* in 'he was accused of *having* run away'; *you* in 'get *you* gone.' (Matr.)

FRENCH TEST PAPER.

(1) State the difference between : *un verre de vin, un verre à vin; jeune, jeûne; l'un et l'autre, l'un l'autre; avant, devant, auparavant; mur, mûr.*

(2) Give the rules for the agreement of *feu, demi* and *nu,* with examples.

(3) How do you form :—(*a*) the plural of nouns in *-au, -eau,* and in *-al;* (*b*) the plural masculine of adjectives in *-al;* (*c*) the feminine singular of adjectives in *-al, -el, -eil?*

Exemplify rules, and mention exceptions. (June 1894).

(2) (*a*) Translate into English :—'*Mon* château est mieux placé que *celui de* mon voisin ; mais *son* parc est plus étendu que *le mien.*' (*b*) Construct three similar sentences of your own in French, with the English annexed, to introduce *celle de, ceux de, celles de,* in the place of *celui de,* and three others to introduce possessive adjectives and pronouns like *mon, le mien.*

(*c*) Translate also :—*She is a friend of mine. Are they not relatives of yours?* (June 1894.)

L'avènement du Café en France.

Sous la régence, Paris devint un grand café. Trois cents cafés sont ouverts à la causerie. Il en est de même des grandes villes, Bordeaux, Nantes, Lyon, etc. Notez que tout apothicaire vend aussi du café et le sert au comptoir. Notez que les couvents eux-mêmes s'empressent de prendre part à ce commerce lucratif. Au parloir, la tourière, avec ses jeunes sœurs converses, offre le café aux passants. Jamais la France ne causa plus et mieux. Il y avait moins d'éloquence et de rhétorique qu'en 89. On n'a rien à citer. L'esprit jaillit, spontané, comme il peut. De cette explosion étincelante nul doute que l'honneur ne revienne en partie à l'heureuse révolution du temps, au grand fait que créa de nouvelles habitudes, modifia les tempéraments : l'avènement du café. . . . L'effet en fut incalculable, n'étant pas affaibli, neutralisé comme aujourd'hui, par l'abrutissement du tabac. On prisait, mais on fumait peu. Le cabaret est détrôné. Moins de chants avinés la nuit. Moins de grands seigneurs au ruisseau. La boutique élégante de causerie, salon plus que boutique, change, ennoblit les mœurs. Le règne du café est celui de la tempérance. Le café, la sobre liqueur, puissamment cérébrale, qui, tout au contraire des spiritueux, augmente la netteté et la lucidité, le café qui supprime la vague et lourde poésie des fumées d'imagination, qui, du réel bien vu, fait jaillir l'étincelle et l'éclair de la vérité. (June 1894.)

MICHELET.

MATHEMATICS.

Arithmetic Course for July.

Those who are thoroughly at home with the manipulation of ordinary decimals, should this month make themselves familiar with the contracted methods of multiplication and division, by means of which a result may be obtained correctly to a certain number of decimal places without going through the whole of the working involved by the ordinary process.

Square and cubic measure may also be read, and problems connected with them; such, for instance, as the papering of rooms, etc.

We solve below a typical example.

Find the cost of carpeting a room, 18 feet long by 18 feet wide, with carpet, 4 feet wide, at 3s. 4d. a yard.

Area of floor = 18×18 square feet.

Area of a piece of carpet = 4×3, being 3 feet long.

Therefore number of pieces of carpet required = $\frac{18 \times 18}{4 \times 3}$.

$\therefore$ cost = $£\frac{18 \times 18}{4 \times 3} \times \frac{1}{3}$ (since one piece costs 3s. 4d., or $£\frac{1}{3}$) = £4 10s.

Algebra Course for July.

Simultaneous quadratic equations, together with a revision of the previous work, will form a suitable month's work. The Chapter in Hall and Knight's 'Elementary Algebra' dealing with the methods of solving such equations should be carefully got up, and plenty of examples worked.

Note the following method :—

Solve
$$\left.\begin{aligned} \frac{1}{x} + \frac{1}{y} &= \frac{5}{6} \\ \frac{1}{xy} &= \frac{1}{6} \end{aligned}\right\} \begin{matrix} (1) \\ (2). \end{matrix}$$

Put $\frac{1}{x} = X$; $\frac{1}{y} = Y$.

The equations then become :

$$X + Y = \tfrac{5}{6} \quad (1)$$

$$XY = \tfrac{1}{6} \quad (2).$$

Square (1) $X^2 + 2XY + Y^2 = \frac{25}{36}$.

Multiply (2) by 4 $4XY = \frac{4}{6}$.

Subtract $X^2 - 2XY + Y^2 = \frac{1}{36}$;

or $X - Y = \pm \frac{1}{6}$.

This combined with $X + Y =$

gives $X = \frac{1}{2}$, or $\frac{1}{3}$; $Y = \frac{1}{3}$, or $\frac{1}{2}$.

Therefore $x = 2$, or 3 ; $y = 3$, or 2.

Euclid Course for July.

Read Euclid to end of III. 30, and revise the earlier propositions of Book III.

Work the following riders :

(1.) Show how to draw a common tangent to 2 circles.

(2.) Show that if a parallelogram can be inscribed in a circle, it must be a rectangle.

(3.) Describe a circle touching a given circle and a given straight line.

Hints on June riders :

(1.) The converse of III. 22 is that a circle can be described about a quadrilateral if the sum of its opposite angles equal 2 right angles. Like most converses, it may be proved by a *reductio ad absurdum*.

(2.) Let O be the centre of a circle, and PB, PC, two tangents from P. Then sq. on OP = sum of sqq. on OB, BP.

Also sq. on OP = sum of sqq. on OC, CP.

Hence sum of sqq. on OB, BP = sum of sqq. on OC, CP.

Taking away equal sqq. on OB and OC, we have sq. on BP = sq. on CP, or PB, PC.

(3) follows easily from (2).

MECHANICS.

Course for July.

The parallelogram and triangle of velocities should be read this month, and at the same time the corresponding propositions for forces, viz., the parallelogram, triangle, and polygon of forces, and the converse of the triangle of forces.

Note that a force having the same characteristics as a straight line, viz., direction, magnitude, and point of application, can be represented by a straight line.

From Newton's second law, if two forces, P and Q, act on a mass of 1 lb. for 1 sec., and generate in it velocities u and v respectively, then

$$P : Q = u : v,$$

or the velocities generated in 1 sec. are porportional to the forces.

Thus if OA, OB, represent 2 forces completely, they will also represent the velocities these forces would generate in 1 lb. in 1 sec.

But by parallelogram of velocities, if parallelogram OACB be completed, OC represents the resultant velocity given to the 1 lb. in 1 sec., and hence OC represents the resultant force, and hence the proposition known as the parallelogram of forces.

Note that if P, Q, R, S, etc., be a number of forces acting at a point, and if OA, AB, BC, CD, be drawn parallel and proportional to P, Q, R, S, etc., respectively, then the forces are in equilibrium if OABCD is a closed polygon ; if OABCD be not a closed polygon, the line OD, which would close it (D being the extremity of the line representing the last force drawn), represents the resultant of the forces.

CHEMISTRY.

Course for July.

This month may be devoted to a study of nitric acid and the various oxides of nitrogen.

If possible, the student should prepare nitric acid for himself by distilling a mixture of KNO_3, or $NaNO_3$, with H_2SO_4 in a retort.

The presence of a nitrate in a solution may be detected by dissolving a crystal of $FeSO_4$ in a small quantity of the solution in a test tube, and then pouring down strong H_2SO_4, which, being a heavy liquid, falls to the bottom ; if a nitrate is present in the solution, a brown ring forms at the junction of the two liquids.

Note the properties of N_2O and NO, and compare them with those of oxygen, also the action on nitric acid on various metals, *e.g.*, copper, silver, etc.

The articles on Chemistry by Mr. Cartwright which appear from time to time in this paper are well worth reading.

Test Paper in Mechanics.

(1.) A balloon is at a height of 2,000 feet, and is rising at a rate of 3 miles an hour ; how long will a stone which is let fall take to reach the ground ?

(2.) A mass of 10 lbs. on a table is connected by a string to a mass of 1 oz. hanging over the edge ; if the former be 10 feet from the edge, what time will elapse before it fall over ?

(3.) A ball is thrown up, and is caught by the thrower 10 secs. afterwards ; how high did it go ?

(4.) A mass of 10 lbs. is suspended by a string, which is drawn aside at 60° from the vertical by means of a horizontal force acting on the mass. Draw a diagram of the forces acting, and find the tension of the string.

(5.) A mass, 12 lbs., is suspended by 2 strings, of lengths 3 and 4 feet, attached to points A and B, in a horizontal line 5 feet apart. State and calculate the magnitudes of all the forces acting.

Mathematical Test Paper.

(1.) The sides of a rectangle are as 3 : 4, and its diagonal is 125 feet. Find its area.

(2.) Having given $x + \frac{1}{x} = 11$, find $x - \frac{1}{x}$, and hence find x.

(3.) Having given that the ratio of the circumference to its radius is 3·14159, find to 3 places the circumference of a circle of radius 2·1437 feet.

(4.) Factorise $1 + y(1 + x)^2(1 + xy)$.

(5.) Describe a circle touching a given line at a given point, and passing through another given point.

Correspondence.

Teachers wishing to have their test papers corrected should send the same addressed to the 'Matriculation Editors,' care of Joseph Hughes and Co., Froebel House, St. Andrew's Hill, Doctors' Commons, London, E.C., and enclose a remittance of 6d. for each paper.

Students desiring to have the papers set in previous numbers corrected can have them corrected on the same conditions.

The Matriculation Editors will be pleased to reply briefly through these columns to those seeking advice.

ELEMENTARY LESSONS IN HORTICULTURE.

BY PROFESSOR J. R. GREEN, M.A.,
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IX.—Insect Pests and their Remedies.

It must not be supposed, as the harassed horticulturist is apt to think, that all insects are injurious to vegetation. Some are quite innocuous, and a few are even of service to the cultivator. Thus the larvæ of the ladybird make aphides (green fly) their constant food. It is indisputable, however, that the list of insect pests is a long one, and to keep their ravages in check requires constant attention on the

part of the governor. This is not surprising when we remember that according to Heer insects comprise four-fifths of the whole animal kingdom, and that there are 190,000 known species (Gerstaecker).

Insects pass through three stages. In the first stage, that of *larvæ*, they are popularly known as maggots, grubs, caterpillars, and in habit are active and voracious. In the second stage, that of *pupæ*, some kinds of insects are inactive and do not feed, *e.g.* the butterfly, beetle, wasp; others are active and feed, resembling the parent insect, except that their wings are not fully formed, *e.g.* cockroach, green fly. In the third stage, that of *imagines*, each *imago*, or insect, consists of a series of thirteen rings, or segments, breathing by means of tubes called *tracheæ*, which convey the air from pores in the sides throughout the system. The head is furnished with horns (*antennæ*), a mouth, large compound eyes, and frequently two or three simple eyes on the top. The *thorax*, or middle portion, is formed of three rings, a pair of legs being attached to each, and in most cases a pair of wings being fastened on the second and third rings. The abdomen consists of nine rings.

Many classifications of insects have been proposed, from the time of Ray downwards. The simplest for the cultivator is the system grouping them into two great classes: *Mandibulata*, insects feeding by jaws or mandibles, and *Haustellata*, insects feeding by some kind of sucker, or *haustellum*. Both these groups may be again sub-divided according to the nature of the wings of the insects comprising them.

Coleoptera, or sheath-winged insects feeding by means of mandibles, have an upper pair of wings (wing-cases), which are horny and leathery, and form a sheath for the large thin under-wings folded beneath them. Their eyes are large, their jaws move transversely, and their antennæ vary in shape. The larvæ may be briefly described as fleshy grubs, usually with a pair of short legs on each of the three segments next to the head, and having scaly heads furnished with jaws. The pupæ are inactive, whitish, and resemble the beetle in shape, the head being bent forward, and the legs and wings laid lengthways beneath the breast and abdomen.

Crioceris asparagi, the Asparagus Beetle, often does a great deal of damage to crops of that vegetable, its grubs eating the leaves and gnawing the tender shoots. The dark-coloured, spindle-shaped eggs may readily be discerned by the cultivator. They are fastened by one end to the shoots and unopened flower-buds. If left alone, slate-coloured grubs are hatched from them, which exude a blackish fluid from their mouths on being touched. As their tail is curved, and they hold fast to the shoot by a fleshy foot, they are very difficult to pick off. In a fortnight they go down into the ground, spin parchment-like cocoons, and come up in about another fortnight or three weeks as perfect blue-black beetles, which are about a quarter-of-an-inch long, and have yellow wing-cases. It is advisable to cut off and burn shoots that are badly infested with the eggs of this beetle, but there are several methods of preventing the ravages of the grubs. Perhaps the best is to clear off the grubs by syringing the plants with water as hot as a hand immersed in it can bear. They then lose their hold, and soot should be thrown over them while they are lying wet on the ground. Another plan is to dip infested shoots in a mixture of half-a-pound of soft-soap, a quarter of a pound of sulphur, and a quarter of a pound of soot well stirred into a pail of warm water. Strewing the plants, while the dew is on them, with unslacked lime, is also said to be an effective remedy.

Bruchus granarius, the Bean Beetle, attacks the seeds of beans and peas, laying its eggs in the finest while they are still soft in the pod. The maggot feeds inside the seed, eating away most of its contents, and when full grown gnaws a round hole to the inside of the seed-husk, where it cuts a circular lid. It then turns to a pupa in the seed in which it has fed, and when spring comes changes to a tiny black beetle with a drooping head, which pushes out the loose lid of its burrow. In the case of these beetles, prevention is better than cure. Seed should be carefully examined before it is sown. At the end of the autumn the beetle-maggots will have eaten their way to the inside of the skin, and a round or oval mark may be seen on the outside, which is duller in colour and more transparent than the rest of the skin. Where bean beetles have left the seed, the holes through which they have escaped will be clearly seen. Where seed containing bean-beetles is sown, the beetles do not suffer by being buried, but come up in due time to infest the new crop. Seed from which beetles have escaped will germinate in most cases, but as a great part of the plant-food stored for the use of the embryo will have been eaten, only a stunted and sickly growth can be expected. Spent hops have been recommended as a manure in cases of this pest, but judgment in the selection of the seed sown is imperative.

Ceutorhynchus sulcicollis, the Cabbage and Turnip Gall Weevil, is a pernicious insect that forms galls singly, or in clusters of knots, in the underground part of the stem of the cabbage and on the surface of turnip tubers. Their life history is briefly this:—The female lays her egg in a small hole pierced in the root, or stem, by her long snout, and a gall then forms containing a legless, yellowish-white fleshy maggot with strongly-toothed jaws. When the maggot is ready to change to a pupa, it gnaws a hole through the rind, and going into the earth, builds up an earth-case in about two months' time, in which it changes to a pupa, and comes out a perfect weevil about an eighth of an inch long, blackish grey in colour, with a long, slender curved snout. The galls formed occasionally run together in great masses, and exhaust the strength of the cabbage plant. In the case of the turnip they do not do much harm, but are better away. The common plan of throwing cabbages infected with these weevils into heaps to rot, or digging them into the ground, is a very short-sighted one, for the beetles bury themselves in the ground and come up after a time by the help of their long-boring snouts all over the place. A better plan is for the gardener to throw them to the pigs, or burn them, and to change the crop to carrots or parsnips, for the weevils will not attack these vegetables. Wood ashes, spent hops, gas-lime, caustic-lime, and soot, all make good dressings in the case of this pest.

Wireworms, the grubs of Click Beetles (*Elater*, *Agriotes*), are probably the most pernicious insect foes with which the horticulturist has to contend.

They feed on almost every kind of crop that is grown, live for several years as grubs, and waste and destroy far more than serves them for food. In appearance wireworms resemble pieces of wire, being smooth, shining, and cylindrical. They are the grubs of the long, narrow, brown or blackish beetle, popularly known as Skip-Jacks, or Click Beetles, from their power of regaining their position, when they are placed on their backs, by a spring or skip, accompanied by a sharp click. Wireworms have three pairs of short legs, and also a sucker-foot below the tail. The eggs from which they are hatched are laid either in the earth close to the root of a plant, or between the sheathing leaves near the base of the stem. They eat into the stem about an inch below the surface of the ground, and sometimes eat their way up the middle of the stalk above the surface. Soil that results from broken turves often swarms with wireworms, and should always be thoroughly picked over. Deep trenching is of service, and traps may be made for them by burying carrots or potatoes two feet apart and six inches deep in the borders, the wireworms found being destroyed every other day. Paraffin, in the proportion of one part to fifteen parts of water, has been found an effective remedy, and drilling manure with the seed helps to ensure the strong, healthy growth that is desirable, for wireworms, as we said before, injure more plants than they destroy. Guano, dissolved bones, soot, a mixture of nitrate of soda and common salt, soda-ash, and rape dust, have all been found to be good stimulating manures for this purpose. The mole, rooks, plovers, and peewits, are of service in keeping down wireworms. These pests are especially injurious to fresh-planted hop-sets, eating off the tiny shoots directly they appear.

Sitona lineata, the Striped Pea-Weevil, and *Sitona crinita*, the Spotted Pea-Weevil, are very injurious to peas, beans, clover, and other leguminous plants. From the end of March till May they attack the edges of the leaf, and eat their way till nothing is left but the stalk and midrib. The Striped Pea-Weevil is of a light clay colour, and has its wing cases striped. The Spotted Pea-Weevil is smaller and greyer, and its wing cases are spotted with black. As it is in their early stages of growth that peas, beans, etc., suffer most from the attacks of these weevils, it is desirable to provide a good seed-bed, friable and rich in plant-food. Wood-ashes, or coal-ashes, placed at sowing time along the drills are found to answer well. Frequent syringing of the plants, followed by a dressing of lime or soot, is also beneficial.

Phyllobreta nemorum, the Turnip Flea Beetle, is another very destructive insect. In appearance it is small, black, and shiny. The female lays its eggs on the under side of the rough leaf. The maggots, which hatch out in about ten days, are white or yellowish, fleshy, cylindrical, possessing three pairs of feet in front, and a sucker-foot at the end of the tail. The head has large dark eyes and cutting jaws. They gnaw their way as soon as they are hatched into the pulp of the leaf, and form winding burrows inside it. After feeding for about six days they assume the chrysalis stage, and in about a fortnight become flea beetles, which gnaw the seed-leaves and the young plants, and also make large holes in the rough leaves. As these beetles infest wild plants of the cabbage tribe—Shepherd's Purse, Jack-by-the-Hedge, and Charlock—these weeds should be carefully eradicated wherever seen. The turnip should be given a fine, deep, clean, moist seed-bed, and it is a good plan to put Peruvian guano or superphosphate of lime with the seed to give it a good start. Watering the crop is of great service. Dustings and dressings of soot, lime, and sulphur should be applied to infested plants when the dew is on the leaves.

One of the most hurtful pests attacking garden fruit-trees is the Red-legged Weevil, *Otiorhynchus tenebricosus*, which in its maggot stage damages the roots of raspberries, currants, gooseberries, strawberries, and vegetables, and as a beetle feeds on the buds, young shoots, bark and leaves of apricots, nectarines, peaches, and plums. This beetle is easily identified by its chestnut-coloured legs. An allied species, *Otiorhynchus sulcatus*, is of a dull black colour, with a short snout. It chiefly attacks vines and strawberries. *Otiorhynchus picipes*, the Clay-coloured Weevil, does great damage to wall fruit-trees, raspberry canes, and vines in hot-houses. The usual method of destroying these beetles in vineries and peach-houses is to spread cloths below the boughs, and shake the beetles down on them, then gather them together, and destroy them with boiling water. It is desirable to clear away clods of earth at the base of walls that may serve as a harbour for these weevils. Cold has very little effect on the maggots of these insects, for they stand twenty degrees of frost. To get rid of them the roots should be thoroughly examined during the winter, and all maggots that are found picked out and destroyed, and the roots dressed with hot lime or soot.

Another beetle that is injurious, both in the larval and perfect stage, is *Cetonia aurata*, the Green Rose Chafer. As a thick, whitish grub, whose yellowish head is armed with strong jaws, it feeds on the roots of strawberries, grass, and other plants; as a beetle, it attacks the blossoms of the rose and strawberry, and eats off the anthers of the stamens of turnip flowers left for seed, rendering the flowers abortive. These grubs are distinguished from those of the cockchafer by having a horny, rusty spot on each side of the segment behind the head, and by the body being covered with transverse rows of bushy hairs. The earth cases in which they turn to ochre-coloured pupæ are each as large as a walnut. The beetles are very pretty, being of a bright metallic golden green above, and coppery underneath. Under the wing cases are large brown membranous wings, by means of which they fly with ease from one feeding ground to another. Hand-picking is the best remedy, both in the case of maggots and beetles. Poultry are of service in clearing the grubs, and tame rooks or seagulls will clear large numbers without hurting the plants.

Two destructive beetles, *Scolytus haemorrhöus*, the Apple-bark Beetle, and *Anthonomus pomorum*, the Apple-blossom Weevil, attack the apple-tree. The former pest is found chiefly in old orchards. The yellowish-white maggots destroy the bark, and infested branches should be burned at once. The latter pest attacks the flower-buds of the apple just before they begin to expand, one egg being laid in each flower-bud. The bud continues to grow, and the petals are of the usual colour. Presently, how-

ever, they begin to wither instead of opening, and inside is found a legless, fleshy, whitish wrinkled maggot, with a black, horny head. The pupæ are of a rusty-brown colour, and the beetles reddish-brown, with three indistinct stripes of a paler shade on the body behind the head. Prevention should be resorted to in the case of these weevils. The bark should be kept clean, so as to afford few hiding-places on the trees, and tarred bandages are recommended to be placed on the ground round the stems, thus preventing the females that have wintered under rubbish near the tree crawling up it in spring to lay their eggs. At egg-laying time cloths may also be spread under the trees, and the weevils shaken down upon them. Good cultivation is of importance, for no eggs are laid on windy days, nor after the flower-buds begin to expand. Trees that have plenty of air and sunlight suffer much less from these pests than close-growing trees.

The Nut Weevil, *Balæninus nucum*, is injurious to filberts and hazel-nuts in the larval stage, its grubs forming the fat, whitish maggots with strong black jaws, so often found in those fruits. They eat away the kernels, reducing them to a mass of nauseous dust, then eat a circular hole in the side of the nut, through which they fall to the ground, where they bury themselves and assumes the pupal form after lying torpid through the winter. The Nut Weevil is rather handsome in appearance, of a rich, tawny-brown colour, with black markings. With regard to remedies, deep cultivation and heavy manuring are of service. Tarred boards may be placed under the trees, and the weevils beaten down where they are very abundant.

Coming now to foliage trees, a few words must be said about the Ash-bark Beetle (*Hylesinus fraxini*), the Elm-bark Beetle (*Scolytus destructor*), the Cockchafer (*Melolontha vulgaris*), the Pine Beetle (*Hylurgus piniperda*), and the Pine Weevil (*Hylobius abietis*). The Ash-bark Beetle, which injures the ash, both in the beetle and grub state, by boring galleries beneath the bark, chiefly attacks sickly trees, and should be guarded against by keeping the trees in health. The ash requires a well-drained soil, shelter, judicious thinning, and the removal of injured or infested branches. It is also a good plan to cover the bark with a good coating of soft soap, or cow-dung mixed with clay and water. The Elm-bark Beetle lays its very numerous eggs in burrows in the bark, usually about three to five inches long. The young grubs, as soon as they are hatched, start at right angles from the parent gallery, and gnaw their way onwards. The maggots are white, the beetle black. Bark attacked by them looks as if it had been pierced with small holes by a brad-awl. Paring off the bark is a remedy for this pest, and brushings with coal-tar, whitewash and fish-oil, or soft soap would probably be of service. The Cockchafer, as a thick, fleshy, whitish grub, feeds underground on the roots of grass, vegetables, and young trees. As a beetle, it strips the foliage of the oak, elm, and other trees. Where they are collected in large quantities they may be shaken down on to large cloths spread beneath the tree and destroyed. Pigs, poultry, rooks, sea-gulls, and the night-jar feed greedily on these insects. Tobacco water, gas water, and fluid drainings from pigstyes are said to drive the grubs from the roots they infest. The Pine Beetle injures pine plantations by boring through the side of the tender shoots into the pith, and eating their way for an inch or two along the centre. These ravages take place in summer, and the next spring high winds cause these shoots to be blown off. Pinching off the infested shoots and burning them is the best remedy in the case of small trees, and all dead and decayed timber or pine-rubbish brush, which may serve as breeding places, should rigorously be burned. The Pine Weevil attacks the Scotch fir, spruce, and larch, its maggots eating away the bark of the stems and shoots, and destroying the buds. It is especially troublesome in young plantations. Burning dying trees, waste timber, and broken bark that may serve for harbourage is very desirable, and traps may be set consisting of pieces of pine bark, thick pieces of log partly buried in the ground, or bundles of pine or spruce twigs. Hand-picking is useful in small plantations, and applications to the stems of the young trees of soft soap and sulphur, or cow-dung and lime, would probably do good. Quicklime has been found to answer well when thrown on the ground round the trees.

The second order of *Mandibulata*, *Euplexoptera*, or tightly folded winged insects with mandibles, has for its representative a most voracious garden foe, the earwig, *Forficula auricularia*. Almost every flower, and in particular the dahlia, suffers from its ravages, and it injures fruit severely. Its appearance is well-known, its minute leathery upper wings have the under wings tightly folded beneath, its mouth is furnished with jaws, and the end of the tail has pincer-like appendages. It is the only insect that watches over its eggs and tends the newly hatched young, which are very similar to the parent in appearance, though paler in colour. The best remedy is found in traps.

The order *Orthoptera*, straight winged insects, is not, generally speaking, injurious to vegetation, but the Mole-cricket, *Gryllotalpa vulgaris*, sometimes causes injury in England to growing crops, and on the Continent is regarded as one of the worst of insect pests.

The order *Thysanoptera*, fringe-winged insects with mandibles, is represented by Thrips, having four fringed wings and bristle-formed jaws. *Thrips minutissima*, which attacks the potato, are extremely minute blackish insects, and are found to be most abundant on plants sheltered from the wind. The best remedy is plenty of air, but dusting with sulphur and syringing with tobacco water are useful local applications.

The order *Hymenoptera*, membrane-winged insects with mandibles, is distinguished by the possession of four naked membranous wings, the upper pair much the larger and marked with a minute thickened spot, the *stigma*. The body is covered with a hard skin, and the abdomen of the female is often supplied with a sting or with an *ovipositor*, by means of which she bores into animal or vegetable matter to insert her eggs. Our first example will be found in the Earth Bee, *Bombus terrestris*, and the Wood Bee, *Bombus lucorum*. These humble bees sometimes cause the whole or part of the bean-pod to become abortive by piercing a hole through the lower part of the calyx into the bean-flower, so as to reach the honey inside. The nest may be found in old walls, heaps of rough stones, in dry tanks, and at the roots of trees. The

remedy where they are very troublesome is to search for and destroy the nests.

The Turnip Sawfly (*Athalia spinarum*), a very pretty bright orange insect with a black head, does very great damage among turnips when in the grub stage. The female lays its excessively numerous eggs in small slits cut in the leaf by its saw-like ovipositor, and the grubs, which are of a greenish white colour, changing to jet black, begin to feed directly they come out of the egg. Only one segment besides the head is unfurnished with feet. They are popularly known as "Blacks," "Black Palmers," "Niggers." With regard to remedies, thick sowing and plentiful liquid manuring are found to be beneficial, and the grubs may be dislodged by sweeping the turnip leaves with twigs of fir, furze, or broom.

Slug-worms, the larvæ of the Pear Sawfly (*Tenthredo cerasi*), feed on the foliage of the leaves of the pear, cherry, plum, hawthorn, and sallow. In shape, they are lumpy and of a blackish colour, and a covering of slime exudes from their skin, giving them the appearance of slugs. They have ten pairs of feet. The female fly is of a brilliant black colour tinged with violet. The flies may be shaken to the ground on boards covered with wet tar, and the slug-worms may be destroyed by dusting with caustic lime, or syringing with tobacco-water, lime-water, strong soap suds, or a solution of hellebore.

The Gooseberry and Currant Sawfly (*Nematus ribesii, Tenthredo grossulariae*) appears about April, and lays her eggs by the largest veins beneath the gooseberry leaves. The grubs, which are of a bluish-green colour with black head, feet, and tail, eat small round holes in the soft part of the leaf till only the stalk and hard veins are left. Wherever these grubs are prevalent, their attack during the next season should be prevented by completely removing the soil with the cocoons. When the caterpillars appear on the bushes they should be picked off by hand, or shaken on to tarred boards and destroyed. Syringing with tobacco-water, alum and water, or lime-water is beneficial. Flour of sulphur, however, is the most effective remedy, and should be dusted over the bushes while they are still wet with morning dew.

The Pine Sawfly (*Lophyrus pini*) appears early in summer. Its green grubs cause great damage to pine woods by feeding on the leaves and on the bark of the young shoots. The male fly is black, the female whitish with black head, breast, and horns. Clearing away cocoons from under infested trees in the winter is the best way of preventing attacks during the next season. Caterpillars can be cleared off the trees by brushing the larvæ with naphtha, dusting the trees with quick-lime or syringing with a solution of hellebore. Shaking the tree over tarred boards, and isolating uninfected trees by surrounding their trunks with bands of fish oil or soft soap are also good measures. Squirrels, woodpeckers, jays, cuckoos, tit-mice, hedge-sparrows, and swallows destroy the perfect flies and the cocoons, but appear to suffer if they feed continuously on the caterpillars.

The Oak Gall-fly (*Cynips Kollari*) has a peculiar apparatus for egg laying, by which one or more eggs with a small quantity of fluid is inserted into the part chosen for attack. An irritation is then set up in the living tissues resulting in a gall. It chiefly occurs on low-growing oak, oak bushes in underwood and hedgerows, and on young trees. The best remedy is to remove the galls while they are young, one by one with a penknife. The tomtit and the black headed titmouse deal summarily with these plagues, making a rough hole in the gall and picking out the contained maggot.

The Giant Sirex (*Sirex gigas*) is a very beautiful fly, black and yellow in colour, but is very injurious to fir timber, boring as it does galleries in the solid wood. Its maggots are whitish, soft, and cylindrical, and possess three pairs of very minute feet. The best method of prevention is to clear away trees that have been injured by accident or ill treatment or weakened by disease, and also trees that have been felled or blown down, for this fly lays its eggs in felled as well as in standing timber.

(*To be continued.*)

NOTES AND NOTIONS.

BY RICHARD WADDINGTON.

'WHAT would you do in my case?' queried a teacher. 'My examination was in May. The week after the whole of my Upper Standards disappeared, and I shall not see their faces again until next October. This is our system of half-time.' And the next morning I felt the truth of—

'We have left undone those things we ought to have done.'

My readers in large schools where the attendance, if not perfect, presents no such difficulty as this, keep this in mind when you are asked to give a long pull, a strong pull, and a pull altogether, in raising the age for half-time employment to twelve.

* * * * *

SIR JOHN GORST is going to move for twelve when the Factory Act (Amendment) Bill comes before the House in Committee. We shall hear of the poor widow, the badly-paid artisan, and the sharpening of the wits. In 1875 the age could not be raised from eight because the industry required the sacrifice of these little slaves. In 1891, the infantile digit theory having exploded, recourse was had to the 'wit sharpening' effect on the child, and the necessities of the poor widow. In 1894 the game is up. The half-time system stands condemned on moral, intellectual, and physical grounds, but still the interested operatives protest. 'The time has not arrived,' is the argument now. And I ask, 'when will it, in the opinion of the operatives?' Before me lies an account of the opening of a hall at Bury for the cotton operatives. The grand piano cost 150 guineas. And this is poverty!

* * * * *

I HAVE been in rural England, and I feel that of many of the teachers it is true that, compulsorily

'Remote from man, with God he passed the days,
Prayer all his business, all his pleasure praise.'

Organ three times on Sunday, Sunday school, and early Communion at 8, is the record all the year round. When the village schoolmaster throws off this mortal coil, a tablet is erected to his memory in the church. No glowing eulogy as to his ability to get 'Excellent' for Drawing six times in succession, or the two shillings for Grammar every year, but his

merit, recorded in letters of gold, lies in the fact that during his career as schoolmaster in this parish—

He buried 815 people.

* * * * *

THE meeting of Assistants in London a week or two ago was remarkable for one or two statements made in public. Messrs. Jackman and Thomas, members of the Executive, made certain statements concerning the work of the Union. From the published report I gather that the protest is against the continuance of certain members who sit, or, by the way, do not sit, round the table at Russell Square. The offence lies in their failing to take anything like an adequate share in the work of the Union. We are told agendas are not opened even. The Executive has recognised this fact for some time. If not, why the resolution of a month or two ago declaring that no member could register an attendance unless present for not less than one and a half hours? Messrs. Thomas and Jackman have simply voiced in public matters of common notoriety among the members of the Executive. As to whether in naming certain members the same unerring accuracy was displayed, I am not disposed to decide. But whatever be the result the task must have been an unpleasant one, and the fact that the subject was not brought before the notice of the Executive confirms my view that the position is matter of free discussion among members of that body.

* * * * *

THERE is an unfortunate statement by Mr. Acland, in reply to a question by Sir Richard Temple, as to the needed reforms in the direction of fixed grants in the Evening School Code. Mr. Acland is reported as saying:—'As to fixed grant, he could quite believe that arrangement would be popular with those who wished to earn money easily, but there would be no guarantee that any scholar had received sufficient instruction.' This is the unkindest cut of all. Every teacher has given Mr. Acland credit for broad views on matters educational. But perhaps Mr. Acland's reply is due to the phraseology employed in the query. Teachers do not ask that grant shall be absolutely fixed in the sense that the outsider might conclude. We hold that so long as a school remains on the grant list it is uneducational to be doling out the grant in sixpennyworths, shillingworths, and eighteenpennyworths. We would still give the Department the power to declare schools inefficient, *and remove them from the list after due warning, and safeguarded by a proper means of appeal.*

* * * * *

WHAT is the position at present? If the geography is not as well taught this year as last, or if the arithmetic is not as accurate as it ought to be, the inefficiency of the school is to be secured for the future by knocking off a shilling for geography, or eighteenpence for arithmetic. Can Mr. Acland devise a more grotesque and baneful system than this? Suppose the First Lord of the Admiralty reports to the Cabinet that the Navy is not as strong as it was last year, will the Cabinet straightway advise a reduction of the Naval vote as a sure and certain way of strengthening the Navy? In nine cases out of ten, where a school fails to reach high-water mark it is a question of finance. The statesmanlike policy would be greater financial help, accompanied by unmistakeable intimation that the weakness must not continue.

* * * * *

TAKE a concrete illustration—a type of thousands. The loss of a shilling or eighteenpence per scholar means the withdrawal of a teacher. At present the finances are strained beyond the point of commercial stability. How is the school to do better next year with less teaching power, and probably a curtailment of the already meagre supply of apparatus? Is Mr. Acland aware that hundreds of voluntary teachers are to-day earning grants which, owing to the seventeen and sixpenny limit, they can never receive? If the estimate of the teachers as a body were a true one, many of the voluntary schools would cease to take more than one class subject. The supervision of the Department, the ambition of the teachers, the competition between school and school, the interest of the parents, and the local management, will always be sufficient guarantee that the State receives adequate return for the money it supplies.

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THE N.U.T. is considering a scheme of Superannuation for the permanent officials. Whatever may be the objections to this course, teachers must bear in mind that they are equally telling against the Government superannuation of teachers. As a stroke of policy it is worth our while to show the Government that we believe in Superannuation. As a statesmanlike policy in the interest of the financial stability of the Union, it is the only course open. Our officials ought all to reach the retiring age about the same time. The strain on the finances of the Union would then be excessive. By ear-marking a yearly sum, the provision of an adequate retiring allowance would hardly be felt by the Union if commenced in time.

* * * * *

I AM glad to note the following letter in the *Wellingborough Post*:—

'THE ILLEGAL EMPLOYMENT OF CHILDREN.

'TO THE EDITOR.

'SIR,—I am directed by the Board to call public attention to the fact that the employment of children of school age in such manner as to prevent such children from attending school in accordance with the Board's Bye-laws, whether such employment is casual or permanent, is illegal, and subjects the employer to a penalty of 40s.

'No child under 11 years of age can be legally employed, and no child between 11 and 13 can be employed, either as a whole-timer or half-timer, unless such child has obtained a labour certificate from the Board. Between 13 and 14 no child can be employed full time without a certificate.

'The Board trust that the public will assist them in carrying out the provisions of the law as to school attendance, and that after this intimation it will not be necessary to take proceedings to enforce the penalty for illegal employment.

'Yours, etc.,
'JAMES HEYGATE,
'Clerk to the Board.

'Wellingborough, 7th June 1894.'

* * * * *

THIS looks like business, and from all I hear it is issued none too soon. That children are illegally employed in and around Wellingborough is beyond dispute. I am told the Factory Act is inoperative in this neighbourhood. The boot and shoe industry must, under present legislation, be difficult to super-

vise, but the extent of the district covered by one factory inspector makes illegal employment easy. Here is a specimen which I am at liberty to name if necessary. A boy, employed half-time, is absent from school although he is regularly at work. The mother meets the master and says, 'Oh, Mr. ——, I intended coming to school to tell you the doctor says our Tommy has scarlet fever, and so he is working full time.' The children attend school at pleasure. Whether they come five half-days or four is a matter left to their discretion.

* * * * *

'Schoolmastering,' says Canon Nunn, 'is the best thing going.' Just as I read that I met a schoolmaster who for himself and wife receives the extravagant salary of £90 a year. I met several who only just turned a hundred for the work of two people. And for this, six days' work with two or three evenings thrown in was required. Sunday was the hardest day of the six. Organ three times and Sunday school twice, with early Communion at 8 every Sunday, holidays included. The Sunday after Easter could not be excused because it was 'within the octave,' whatever that may mean. 'The best thing going!' Why, if the man and his wife turned a 'hurdy-gurdy' for the same number of hours they would be better off.'

* * * * *

But the miserable pay is not all. What about the conditions of servitude? What with the small School Board member, and the intolerant and overbearing manager, the work of the schoolmaster in some places would not be 'the best thing going' at four times the salary. One manager stipulates for no connexion with Dissenters. Another requires a correct and obsequious bow on entering the school. It is hardly credible, but we will give a sample. The clergyman enters the school while the children are at drill. The master is playing the harmonium. The vicar goes to the master, and says, 'Mr. ——, do you mean to insult me?' 'I had no intention,' says the master. 'Then why didn't you stop playing when I entered?' is the reply.

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Let me give another. The vicar never gives even the common 'Good morning' when he enters, but expects the master to bow. One morning the master was staggered with, 'Mr. ——, your bow is not quite correct this morning.' Let us hope he meant his necktie; but I am assured he didn't.

* * * * *

The Science and Art Department is playing a curious and inexplicable game just now. There is no doubt the standard for Day Schools has been raised. The result is the lowering of many schools from 'Excellent' to 'Good.' There are some people who have a nasty habit of distrusting the artistic judgment of South Kensington, and appeals are frequent. In my case they raised the school's award, and in several other cases that have come to my notice the award has been revised. And, so far as I can hear, the explanation is invariably that the work was as good as last year.

* * * * *

The Code now provides compulsory recreation during every school meeting of two hours. Teachers will not regret this attempt to prevent weariness. But if there is one person who requires a regulation on these lines, but far more stringent, it is H.M.I. Too often the 'worrying' process is extended over a couple of hours without break. Infants, even, are kept at full tension for an hour at once, in order that the Inspector may award the Discipline mark.

* * * * *

Can nothing be done to prevent this? If there is one time more than another when danger is run, it is when the child is at full examination fever. The Department ought to bring home to the Inspectorate the absolute necessity of restricting the oral examination to half-hour periods. In the desire to puzzle, some few Inspectors forget the fact that children are children.

* * * * *

Here is a problem that deserves the attention of My Lords:—How is it that the appearance of some of her Majesty's Inspectors drives the blood from the cheeks of the teachers, unnerves the scholars, and creates a general feeling of alarm, while the visit of another is like a ray of sunshine?

QUERY COLUMN.

Puzzled.—Solve:—

$$\sqrt{\frac{x}{2}} + \sqrt{3x+1} = 7.$$

(*Todhunter's* 'Algebra for Beginners').

$$\sqrt{\frac{x}{2}} + \sqrt{3x+1} = 7$$

$$\sqrt{3x+1} = 7 - \sqrt{\frac{x}{2}}$$

Squaring each side:

$$3x+1 = 49 - 14\sqrt{\frac{x}{2}} + \frac{x}{2}$$

$$14\sqrt{\frac{x}{2}} = 49 - 1 - 3x + \frac{x}{2}$$

$$= 48 - \frac{5x}{2}$$

Squaring each side:

$$196 \times \frac{x}{2} = 2304 - 240x + \frac{25x^2}{4}$$

$$98x = 2304 - 240x + \frac{25x^2}{4}$$

$$\frac{25x^2}{4} - 240x - 98x = -2304$$

$$\frac{25x^2}{4} - 338x = -2304$$

$$x^2 - \frac{1352x}{25} = -\frac{9216}{25}$$

$$x^2 - \frac{1352x}{25} + \left(\frac{676}{25}\right)^2 = \frac{456976}{625} - \frac{9216}{25}$$

$$= \frac{456976 - 230400}{625}$$

$$= \frac{226576}{625}$$

$$x - \frac{676}{25} = \pm\frac{476}{25}$$

$$\therefore x = \frac{676}{25} \pm \frac{476}{25}$$

$$= \frac{1152}{25}, \text{ or } 8.$$

The first value is inapplicable,

$$\therefore \underline{x = 8}. \quad \text{Ans.}$$

Perplexed.—A man has £4,100 which he invests in the 3 per cent. stock at 87, and 5 per cent. stock at 104; what sums must he invest in the respective stocks to make 3½% on the whole?

$$\text{Income} = 3\tfrac{1}{2}\% \text{ on } £4{,}100$$
$$= £41 \times 3\tfrac{1}{2}$$
$$= £143\tfrac{1}{2}.$$

Income if whole were invested in first stock

$$= £4{,}100 \times \tfrac{3}{87}$$
$$= £\frac{4100}{29}$$
$$= £141\tfrac{11}{29}.$$

Difference between the two incomes

$$= £143\tfrac{1}{2} - £141\tfrac{11}{29}$$
$$= £2\tfrac{7}{58}.$$

Difference on an investment of £1 in the two stocks

$$= £\frac{5}{104} - £\frac{3}{87}$$
$$= £\left(\frac{5}{104} - \frac{1}{29}\right)$$
$$= £\frac{145 - 104}{3016}$$
$$= £\frac{41}{3016};$$

∴ Amount invested in second stock

$$= £(2\tfrac{7}{58} \div 2\tfrac{41}{3016})$$
$$= £\left(\frac{123}{58} \times \frac{3016}{41}\right)^{52}$$
$$= £156;$$

And amount invested in first stock

$$= £4{,}100 - £156$$
$$= £3{,}944.$$

THE SELECTION AND TEACHING OF SCHOOL SONGS.

By J. A. McGregor,

Music Instructor, Burslem School Board.

The ultimate aim of all our study and practice of musical notation should be for the selection and teaching of suitable school songs.

There is a tendency at the present day for the teacher to become absorbed in note, time, and ear tests, and to neglect what, after all, is really the best and most interesting study of the combined time and tune tests, viz., the well chosen school songs.

En passant, we are pleased to notice the great improvement in musical taste among school teachers, as shown by the selection of high class songs for the popular Choral Competitions of all our leading centres.

To many parents and visitors the school song is the first impression of the standard of excellence attained by the scholars, and also to the scholars the song is the bond of sympathy, and in after years often recalls the many happy hours of school life.

At the outset let us bear in mind that it is to be *a song for children*, and the teacher should avoid difficult classical music.

Speaking generally, the teacher should notice:

1. The words—bearing in mind the age of the scholars.
2. The compass—which should be limited.
3. The melody—only selecting singable and attractive ones.

I. In Infants' schools action songs should be attempted, always having words suitable to the age of the children, and avoiding tunes going beyond the compass C to D¹.

Often one hears little mites of four and five spoiling their tender voices by attempting songs embracing E¹ and F¹, and even G¹, and the unskilful teacher urges the children to sing *louder!*

The teachers of Infants are severely handicapped in their work, as very few competent and experienced writers venture to prepare songs for the little singers.

If some of our musical lady teachers would turn their attention in this direction, and write songs for *Infants*, they would earn the gratitude of the Infants' Mistress.

II. In Standards I. and II. five unison songs are to be presented. Here is the place to lay a good foundation. I strongly recommend teaching *by ear* alone. Six-pulse measure songs (with the attractive swing) may be attempted, bearing in mind our three main rules for guidance of selection; and then insist upon concentrated attention to teacher's pattern, watching the beat, position of body, pronunciation, and a slight attention to expression.

The power to imitate correctly is very strong, and the teacher must speedily recognise that the major part of the faults present are due to *bad patterning*.

III. The pupils of Standards III. and IV. may be promoted to book work, and the music publishers vie with each other in producing suitable and cheap books.

The teaching here should be *from the notation*, 'drawing out' from the pupils the kind of measure, length of notes, etc. Breathing places should be observed in addition to the points named above, as well as explanations of words and phrases to deepen the scholars' interest in the song.

The teacher should check the tendency to *sing into the book*.

As speedily as possible master the notes and the words, and then insist upon the undivided attention of every scholar to the teacher's *baton*.

Rounds form an admirable introduction to part-singing.

IV. In our Senior Divisions we may hope to find the practical evidence of systematic and skilful teaching. The refined singing at the Medallion Competition—previously referred to—has been a revelation to our leading musicians.

Here teaching should be *entirely by note*. Two-part songs are most suitable for this division, for by these the scholars are not necessarily divided into Treble and Alto as regards compass.

Three-part songs should only be used with caution, as much injury is often done to the voices of boys and girls set to sing the lower part.

Always avoid taking the two top lines of songs set in four-part harmony, and adopting these as a school song. The effect is not pleasing, to say the least. Students of harmony can supply the reason.

The teacher should have his modulator at hand for songs containing two removes or chromatics.

Expression, refinement of tone, mouth opening, pronunciation, and breathing places must receive close and continuous attention here.

Let the teacher aim high, but keep well within the mental reach of the children.

Train your scholars to sing, as soon as details of time and tune are mastered, without attention to the books.

When should we begin to teach the songs? is a frequent question. The plan I recommend is to devote the first four months to mastery of note, time, and ear tests—the foundation for the year's work—then one song per month, and the last three months for Code Preparation and Examination.

In many cases the blackboard is more successful than books for song teaching purposes.

In conclusion, the teacher has in a great degree the direction of musical taste in his own hands. Here we have the musical audience, and even performers, of the near future, and if the foundation be good, the progress of music in this country is assured.

Society of Arts Examination.—The results of the Society of Arts Examinations in various commercial subjects, held throughout the United Kingdom in March last, have just been published. There were 4,375 papers submitted to the examiners (an unprecedented large number), out of which 2,126 were for Book-keeping. Shorthand came next with 805. There were 131 centres of examination, 23 of them being in London. Pitman's Metropolitan School of Shorthand and Business Training College, 27, Chancery Lane, London, stands easily first in the United Kingdom for results. Splendid as have been its successes in past examinations, they are completely eclipsed by the School's record for 1894. Last year the School submitted 242 papers, of which the odd 42 failed. This year 283 were sent up for Shorthand, Typewriting, Book-keeping, German, French, Spanish, Italian, and Portuguese, and only nine failed. As against 19 first-class certificates, 67 second, and 114 third, in 1893, there are this time 60 first-class, 138 second, and 76 third. The total pass results are 97 per cent., by a very long way the best results of any centre. The School also takes first place in the kingdom in German (140 candidates). The recent Society of Arts Examinations demonstrate that the Metropolitan School has lost none of its prestige by change of management, and has, by the results of this examination, fully sustained its claim to be considered the leading training school in the United Kingdom for Shorthand, Typewriting, Book-keeping, and Modern Languages.

LEGAL AND CODE QUERIES COLUMN.

RULES.

1. All communications must be addressed 'Legal Editor, PRACTICAL TEACHER, Froebel House, St. Andrew's Hill, Doctors' Commons, E.C.,' and must be accompanied by our 'coupon,' duly filled up.
2. Replies will be given *only* in this column, except under the conditions named in Rule 3.
3. If any reader desires a reply by post, such can be forwarded by enclosing, in addition to the coupon, a stamped addressed envelope and either stamps or a Postal Order to the value of one shilling.
4. No original documents should be forwarded, but copies only. We cannot hold ourselves responsible for any losses which occur through non-observance of this rule.

'UNION JACK.'—This is not the flag of England, the English ensign being simply a red cross on a white ground. The Union Jack consists of three crosses, those of St. George of England, St. Andrew of Scotland, and St. Patrick of Ireland. St. George's cross is upright and is coloured red on a white ground. In the Union Jack the white edging shews the white field. The other two crosses run from corner to corner of the flag. They are difficult to distinguish unless you are familiar with heraldry, but they are there. It is said that this union flag ought not properly to be termed a Union Jack except when flying on a ship, but usage certainly points the other way.

L.R.—The Epicureans and Stoics were respectively schools of philosophers. It would not be possible in this column to expound their doctrines. The Stoics were so called because their founder, Zeno, used to give his lectures in a '*stoa*' in Athens. (Greek, *stoa*, a porch.) The Epicureans were founded by Epicuros, his axiom being 'happiness or enjoyment is the *summum bonum* of life.'

'SPES.'—Yes, you are eligible. Send in an application to The Secretary, Science and Art Department, South Kensington, S.W.

'INCOME TAX.'—If the Finance Bill which, at the time of writing, is before the House of Commons become law, it will apply to the whole of the financial year 1894–5, and persons whose assessable incomes for the year ending April 5th, 1895, are within £160, will not be liable to Income Tax. There is an attempt being made to provide for the separate assessment of the incomes of married couples. The amendment is on the business paper of the House of Commons, but it has not yet been reached.

'UNBELIEVER.'—Yes, it is quite true that if a house is destroyed by fire, the tenant can be compelled to pay the rent as it falls due, even though he is deprived of the occupation.

'WILL.'—It is useless, as since signature the testatrix has married.

M.G.—The Certificate Examination in 1895 will take place at the end of June or the beginning of July. You cannot sit at the Scholarship Examination in July next, unless you have already made application. No applications can be received now.

W.S.R.—Any person may be a member of a School Board, provided the age of 21 years has been reached. Man and woman, resident and non-resident, householder and lodger, peer and peasant, cleric and layman, all are eligible. Idiots, bankrupts, and members of the school staff are, however, specially barred.

R.M.—You can qualify yourself for service in a government school in two ways: (1) By passing the Queen's Scholarship Examination, and then serving for at least one year in inspected schools under certificated teachers before sitting for the Certificate Examination. (2) By passing either of the examinations named in the footnote to Art. 51 of the Code, and then serving in an elementary school as an assistant teacher.

W.R.S.—You appear to have a right of action. Proceedings should be commenced in the local county court. It is not necessary to employ a solicitor to take out the summons. Go to the office of the Court, state your case, the officials will direct you as to procedure.

J.M.—'What others have done I can do,' should be your motto. All things are possible to the man with courage, self-denial, and perseverance. My experience leads me to the conclusion that lack of 'self-denial' is the cause of most of the failures in life. I have known many young men ambitious like yourself, set out on the right road, and who have come to grief. If you wish to become a barrister, you should, as a first step, get work in London. Next, you should matriculate at a University. This step is not absolutely necessary, but it is one which I advise. You will then have to keep 12 terms (about 3 years) in the Temple. The fees are heavy, but *self-denial* will get over this difficulty. The examinations are increasing in stiffness, but they ought not to prove a stumbling-block to you. Work for a University degree at the same time. With 5 years of hard work and *self-denial* you can obtain a degree and a call to the Bar.

PUBLICATIONS RECEIVED.

W. H. ALLEN AND CO.

Picturesque Geographical Readers, Standard I.
Waterloo Science Readers (Newsholme).
Natural History Readers, Standard I.
Beach's Historical Readers.
Object Lesson Notes (Mrs. Mortimer).
Waterloo Reader, Standard III.
Problematic Arithmetic for the Seven Standards. Answers to the Problematic Arithmetic for the Seven Standards (Capel).

BELL & SONS.

Lyrics and Elegiacs (Rickards).

BLACKIE AND SONS.

Cookery for School-girls (Macdonald).
Guide to the Queen's Scholarship Examinations (Smith).
Sir Roger de Coverley (Wilcroft).
Test Papers in Mathematics (Roberts).
Typical Government Problems, Standards II. and VI.
Solid or Descriptive Geometry (Dobbie).
The Warwick Shakespeare: Hamlet.
A Classical Compendium (Brownrigg).
Systematic Botany (Oliver).
French and German Echoes.
Standard Drawing Sheets, I. and II., IIIa., IIIb., IV.
Suggestive Word-Building and Spelling Book, Infants, St. I. and II.
Vergil's Aeneid (Church).

CAMBRIDGE UNIVERSITY PRESS.

Heat: An Elementary Text-Book Theoretical and Practical for Colleges and Schools (Glazebrook).
Light: An Elementary Text-Book, Theoretical and Practical, for Colleges and Schools (Glazebrook).

CASSELL AND CO.

The Llollandilaff Legends.
Lessons in Our Laws, or Talks at Broadacre Farm (Lester).
The World's Workers, John Cassell (Pike).
Italian Lessons (Butler).

W. & R. CHAMBERS.

Chambers' Copy Books.
Domestic Economy for the New Code (Rigg).
Elementary Science, Standard III. (Todd).

CHAPMAN AND HALL.

Shaded Drawing Cards (Cheese).

C. J. CLAY AND SONS.

The Church Catechism Explained (Robinson).

W. B. CLIVE & CO.

University Correspondent.
Sophocles: Electra (Thompson & Hayes).

CURWEN AND SONS.

School Cantatas: The Fairy Mirror (Kirk and Coward).
Medburn Bar-Bell Exercises (Farrington).
Medburn Dumb-Bell Exercises (Farrington).
The Musical Herald.

EDUCATIONAL SUPPLY ASSOCIATION.

Viaduct Arithmetics, 1, 2, 3, 4, 5, 6.
Viaduct Geography, 1, 2, 3, 4, 5, 6.
Viaduct Grammar, 1, 2, 3, 4, 5, 6.

A. W. HALL.

The Christian Weekly.

A. M. HOLDEN.

The New Readers, Standard VI. (Meiklejohn).

W. AND A. K. JOHNSTON.

Grayston's Drawing Sheet No. 8.

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Christmas Number of the Animal World.

SHORTHAND CO.

Oxford Shorthand Chronicle (2 numbers).

SMITH, ELDER & CO.

Cornhill Magazine, February.
Cornhill, March.

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London Matriculation Directory, January 1894.
Livy: Book III. (Masom).
Co-ordinate Geometry (Briggs and Bryan).

T. FISHER UNWIN.

Stammering: Its Nature and Treatment (Behnke).
Side Lights (Runciman).

WHITTAKER AND CO.

School Calendar, 1894.

REVIEWS.

Mechanics and Hydrostatics. By Prof. S. L. Loney, M.A. Cambridge University Press.

There is no pretension about this work beyond that of logical arrangement, careful selection, and clear explanation. It is strictly of an elementary character, yet not so popularly written as to leave anything hereafter to unlearn. The compiler gets to work as soon as possible, and perhaps is rather too meagre in his preliminary explanations. Too little is said concerning the direction and equilibrium of forces, and a theoretical proof, such as Du Chayla's, of the Composition of Forces, is lacking until we come to Newton's Laws of Motion. Chapter VIII., on the Centre of Gravity, deserves especial praise. It is seldom so intelligibly dealt with. Bent levers of a simple kind are absent from the chapter on machines; in other respects it is quite as complete as the scope of the manual allows. In dynamics we cannot find the important theorem, 'If a circle be drawn in a vertical plane, and from its highest point chords be drawn, the time occupied by a body in running down any chord is constant.' This would have been well inserted after Article 187. The remaining chapters of this section call for nothing save commendation of a high character. The Hydrostatic portion is very competently managed; but in dealing with the Hydrostatic Press, Bramah's collar could have been most interestingly explained. We are glad to see that the limits to Boyle's Law are mentioned, as these are daily becoming of more practical importance. The volume closes with some useful test papers, and ten pages of very helpful elementary trigonometry; and arranged throughout the book are some 600 carefully graduated exercises. Professor Loney has produced a work calculated to assist teacher, pupil, and private student, and which cannot fail to be extensively adopted.

Heat. By R. T. Glazebrook, M.A., F.R.S. Natural Science Manuals. Cambridge University Press.

Undoubtedly we have here a truly educational production, induction, and illustration by experiment, followed by theoretical explanation. To us it appears that no other method of dealing with natural science is rational. Mr. Glazebrook gives us no less than 50 experiments, most of them beautifully simple and suggestive, and yet requiring no elaborate apparatus, whilst numerous others not entered into with detail are mentioned for the student's consideration. One most useful feature is the pointing out of observational errors likely to occur, in so plain a manner, that the compiler appears to be at the elbow of the tyro, and training him in practical physics. It is almost invidious to single out points for honourable mention, as all seem equally deserving; but the improvement on the older manuals is best shown in the remarks upon Absolute Dilation of Liquids, Absolute Temperature, Prevost's Theory of Exchanges, and the account of Joule's and Mayer's experiments. There are about 130 exercises, with numerical answers appended, and numerous examination questions. From cover to cover everything is of the best, and we predict its early and extended use in Science Schools. It is a distinct advance upon all others of its kind, and any teacher of 'Heat' unacquainted with its contents will be severely handicapped.

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PINAFORE, with full directions for Materials, Cutting-out and Making up, appears in 'GIRLS' MISTRESS,' *28th April*, 1894.
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The Student's Special History, 1689 to 1832. By D. Fearon Ranking, M.A., LL.D., and J. Gibson, M.A. London: Relfe Brothers.

To use a well-worn formula, there are cram-books and cram-books. Some are marked by such thoroughness, such skilful condensation, and such masterly marshalling of facts as to serve their main purpose well, and also to win hearty commendation as standard text-books. The 'special' title of the book before us, the fact that the compilers are experienced 'coaches' for the Civil Service and Army Examinations, and the intimation they give in the preface that they determined on its publication because they were so forcibly struck by 'the want of a good history for the special period between the Revolution and the Reformation' (*sic*), all seemed to justify us in expecting to find the work worthy of a place among the best of its class. But examination proves that it is a cram-book *et pretera nihil*. We can well believe it to be what the preface describes it, the authors' 'MS. of Analysis and Notes put in print.' But while such a summary may be of great use to lecturers and 'coaches,' who have made it for teaching purposes from extensive reading, which it serves effectually to recall, it is of very little use to the student in general, unless he has made it for himself from his own reading. He *must* read the larger and more important books on his subject and period, and if he needs a ready-made summary for rapid revisal, it ought to have enough of the cementing and co-ordinating elements of our language to show the relations of facts, and to make the narrative, however concise, at least articulate and coherent. This is the kind of material the book presents :—

'Porteous Riots, 1736.
'Quarrel between King and Prince of Wales.
'Opposition attacks Peace Policy. Jenkin's ear.
'Family Compact, 1733, between Spain and France to hamper trade of England.
'Pitt opposes Convention with Spain. Secession of Opposition.
'War declared, 1739.
'Fresh attacks on Walpole, 1740.
'Anson takes Paita.
'Walpole resigns, 1742,'

and so on, with abundance of italics. To us this fragmentary reference to series of events seems the merest 'dry bones,' and that is the general character of this manual. Stay, there is a trace of 'flesh and blood' on p. 66. It is put in square brackets :—

'*Siege of Gibraltar.* [My great grandfather, then Captain de L'Hoste, was Elliot's aide-de-camp during the siege.]'

We are bound to say that the pages abound in details; our complaint is that these are so disconnected and so lacking in what might give interest to them, and so assist the memory. One part in which this fault is less marked strikes us as being worth much more than many whole pages of the rest. It is the summary of facts concerning the 'Re-establishment of the Coinage, May 1695,' on pp. 11 and 12.

The Manchester Arithmetic: Standards I. to IV. By Alfred J. Pearce. London: Simpkin, Marshall and Co., Limited.

This series of pupils' class-books is decidedly practical and thorough. The exercises are very numerous. Brief explanations are given with worked examples. The problems are arranged in sets according to the mode of working, and care is taken to illustrate every variety of form and wording. One special feature is the introduction of additional exercises for practice in recapitulation of the work of previous standards and preparation for that of the next. We feel confidence in recommending the series to the notice of teachers.

Magic Lantern Slides. London: Geo. Philip and Sons.

We have received specimens of Messrs. Philip's set of slides prepared in illustration of Gothic architecture and historical subjects. We have put them to the test in our own school, and have found them in every respect satisfactory, yielding as they did a picture with a sharpness of definition and a completeness which makes the slides real educational aids.

Illustrated Manual of Hand and Eye Training on Educational Principles. By. Dr. Woldemar Goetze. London: Newmann and Co.

The vexed question of manual instruction, like so many other educational questions of vital moment, is in that position so aptly described by Herbert Spencer as 'the disagreement of the enquiring.' Hence every contribution tending to throw light upon the way in which we should move is of great interest, especially when emanating from the practice and intelligence of such an authority as Dr. Goetze undoubtedly is. Therefore we have perused this volume with great interest, and, whilst disagreeing on many points with the doctor, we have been amply repaid for our pains. The peculiar charm of the book consists in the fact that the subject is approached, and justly so, from the pedagogic standpoint, and with an earnest desire to see and do justice to the other side. Furthermore, the historical account of the evolution of manual training is sensible and valuable, whilst the bibliography of the subject is not neglected, as is evidenced by the many authorities referred to in the body of the work as well as by the list of works given at the end. Altogether English teachers have cause to feel grateful to Dr. Goetze for the book, which we have pleasure in recommending to all of our readers who wish to be *au fait* as to manual instruction. The short note on German schools might well have been amplified considerably.

Monthly Progress Arithmetical Tests. By R. Waddington. Bolton: of the Author.

These cards are devised to test the progress of each standard in arithmetic month by month up to and including the fourth month of the school year. The sums are exactly suitable, and the graduation is just what might be expected from a practical teacher such as Mr. Waddington is. We can speak well for the accuracy of the answers, as in no case have we found them to be wrong.

Broadacre Farm; or, Lessons in Our Laws. By H. F. Lester. London: Cassell and Co.

This is an attempt to teach citizen rights and citizen duties biographically and experimentally by reciting the experiences of a mythical Anglo-African, by name Wellington Edwards. The working out of this idea is skilful, and we believe that the average schoolboy could be made to get both interest and profit from Mr. Lester's book. The typing, binding, and illustration are on the same style as in Messrs. Cassell's well-known school books, so that teachers on the look out for a reading book on our laws will do well to examine the volume now before us.

Royal English Arithmetics: Standards V.-VII. London: T. Nelson and Sons.

Quite a thesaurus of apt examples and exercises in arithmetic is to be found in the three booklets now on our table. We have carefully examined the grading of the books, and have been satisfied on this all-important point. The printing is clear and distinct, and not calculated to unduly strain the eyes of the scholar, hence the suitability of the books for adoption is within our mind quite established.

Mental Arithmetic for the Standards. London: Macmillan and Co.

From Standard I. to Standard VII. we here have a collection of mental exercises in arithmetic characterised by variety and intelligence. The answers are not given. We feel sure that the books may safely be put into the hands of junior teachers to give variety to their questionings on this all-important subject.

Aldersgate Atlas. London: Relfe Bros.

This is an excellent atlas, in which are found 72 maps, ancient, modern, and physical. Care has been taken to exclude unimportant names, and great has been the gain in clearness by consequence. The maps of England, Scotland, and Ireland occupy two pages respectively, a fact which enables more detail to be conspicuously shown than would otherwise be possible. The atlas has our cordial approval.

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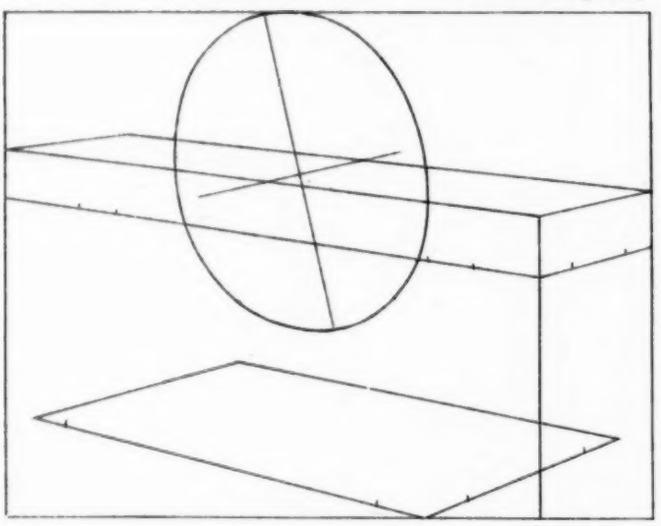

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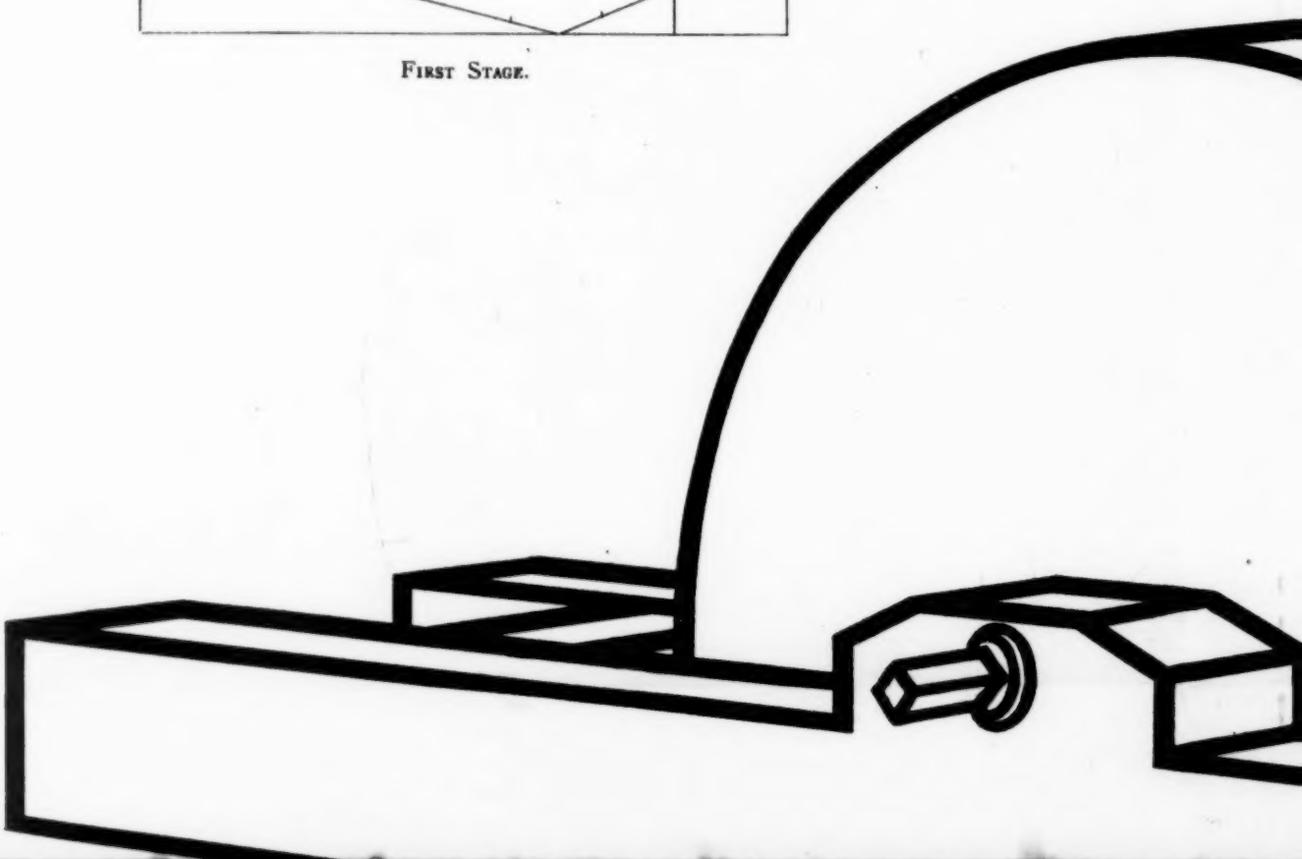

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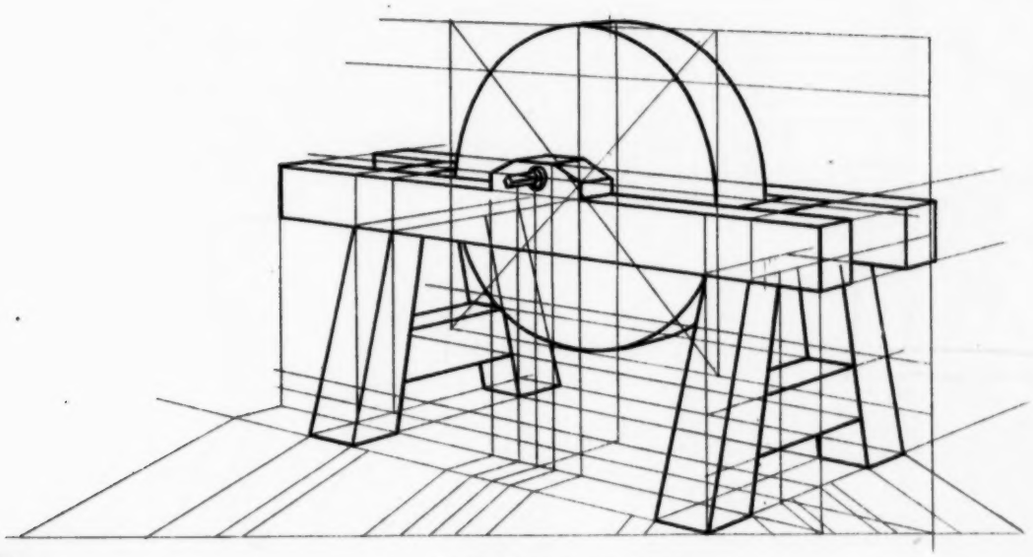

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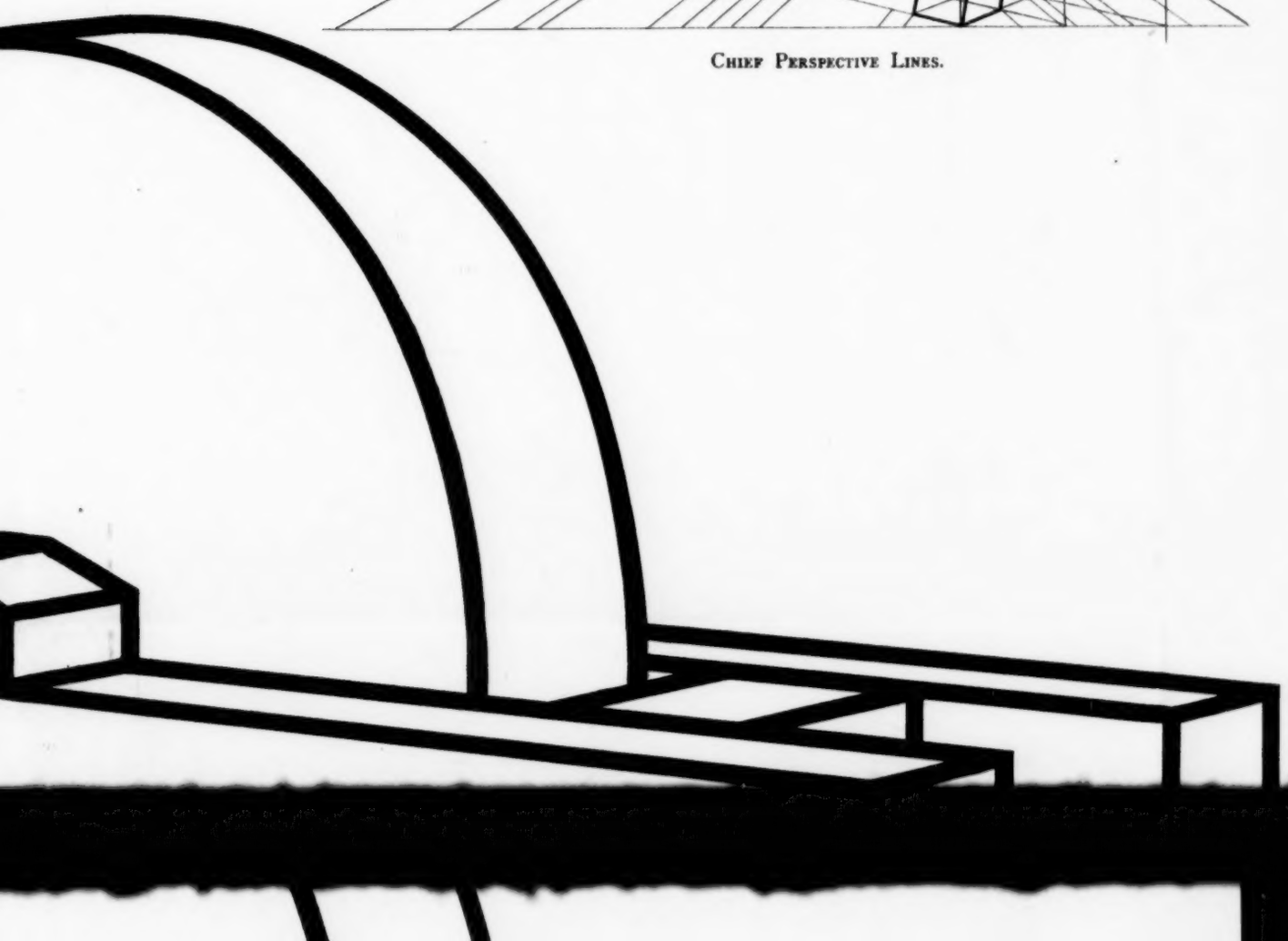

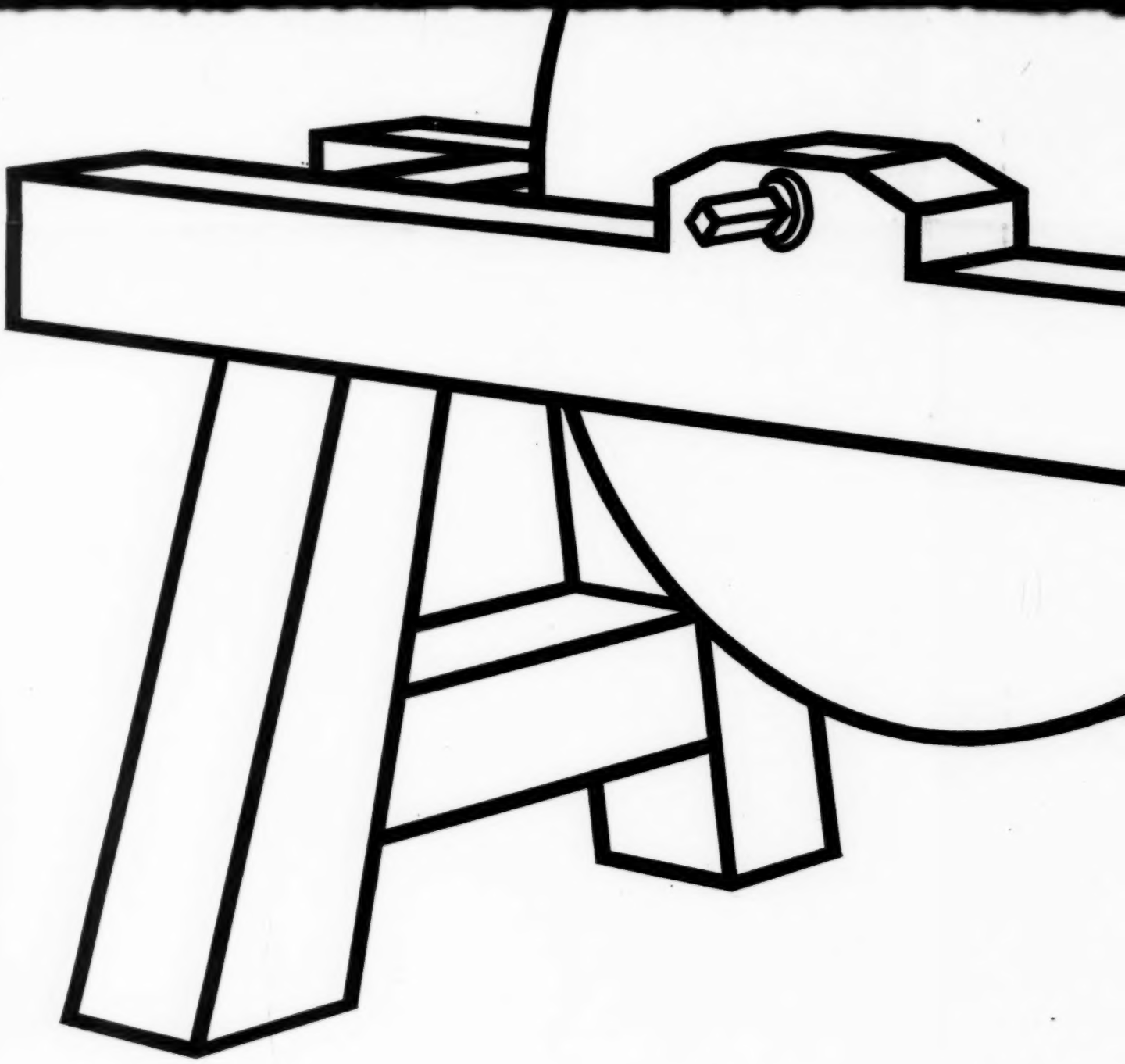

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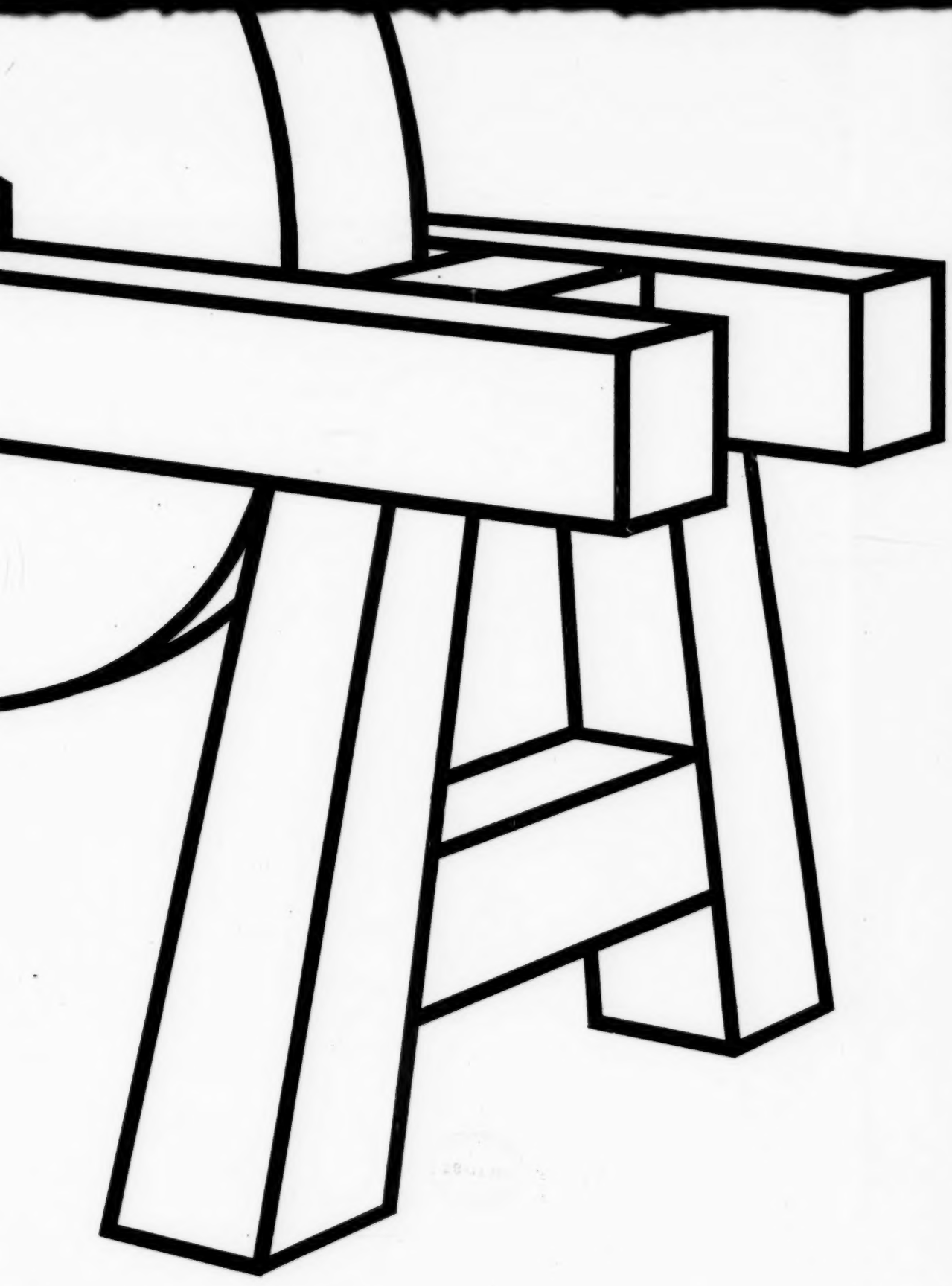

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